ARMY MEDICAL LIBRARY
WASHINGTON
Founded 1836

ANNEX
Section

Number 291573

GPO 3—10543 FORM 113c, W. D., S. G. O. (Revised June 13, 1936)

ON THE

THEORY AND PRACTICE

OF

MIDWIFERY.

COPYRIGHT
May 22
1851.

BY

FLEETWOOD CHURCHILL, M.D., M.R.I.A.,

HON. FELLOW OF THE COLLEGE OF PHYSICIANS IN IRELAND; CORRESPONDING MEMBER OF THE AMERICAN NATIONAL INSTITUTE, ETC. ETC.

WITH NOTES AND ADDITIONS,

BY D. FRANCIS CONDIE, M.D.,

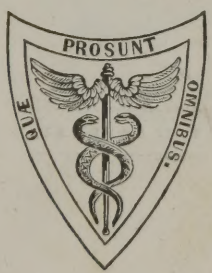
SECRETARY OF THE COLLEGE OF PHYSICIANS; MEMBER OF THE AMERICAN MEDICAL ASSOCIATION; MEMBER OF THE AMERICAN PHILOSOPHICAL SOCIETY, ETC. ETC.

WITH ONE HUNDRED AND THIRTY-NINE ILLUSTRATIONS.

A NEW AMERICAN,

FROM THE LAST IMPROVED DUBLIN EDITION.

ARMY MEDICAL LIBRARY
291573
WASHINGTON, D. C.



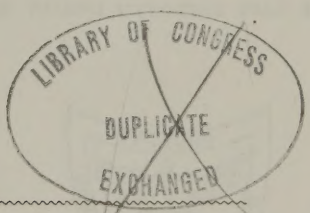
PHILADELPHIA:
BLANCHARD AND LEA.
1851.

WQ
C563on
1851

Entered, according to the Act of Congress, in the year 1851, by

BLANCHARD AND LEA,

In the Clerk's Office of the District Court of the United States, in and for the Eastern District of Pennsylvania.



PRINTED BY C. SHERMAN.

TO

CHARLES JOHNSON, ESQ., M.D.

AND

ROBERT COLLINS, ESQ., M.D.

This Volume is Dedicated,

WITH THE

GREATEST RESPECT FOR THEIR PROFESSIONAL ATTAINMENTS
AND GRATITUDE FOR THEIR KINDNESS.

PREFACE

BY THE AMERICAN EDITOR.

The preparation for the press of Dr. Churchill's Treatise on the Theory and Practice of Midwifery has been undertaken by the present editor, at the request of the American publishers; Dr. R. M. Huston having been prevented by his numerous other engagements from performing in regard to this edition the same editorial office he has so ably executed in reference to those which have preceded it.

The present is reprinted from a very late Dublin* edition, which had been revised and brought up by the author to the present time, and which confessedly presents a most faithful and able exposition of every important particular embraced in the department of Midwifery.

The editor of the present edition may, perhaps, be accused of temerity in presuming to add anything to a work affording so full and accurate a view of the subjects of which it treats; he nevertheless believes that the notes and additions he has made, which include most of those by the editor of the preceding editions, will be found not altogether valueless.

D. F. C.

Philadelphia, March, 1851.

* See the Author's Preface to the Second Dublin Edition.

AUTHOR'S PREFACE

TO THE FIRST EDITION.

THE object of the publishers of this volume is to offer to the student in Midwifery a work, embracing the modern discoveries in the physiology of the uterine system, with all the recent improvements in practice, in a condensed form, amply illustrated, at a moderate price.

At their request I have undertaken the literary department, and I must confess, with diffidence, after the excellent treatises of Drs. F. Ramsbotham and Rigby. I have, however, entered more fully into the physiology of the system than they have thought necessary: nor have I hesitated to avail myself of their labours, and those of other distinguished authors, so as to render the theory and practice as complete as possible.

I regret very much that it was incompatible with the size of the volume to admit ample references; however, after the avowal I have just made, it will be understood that their omission has resulted neither from a wish to claim the merit of originality, nor from a desire to save myself trouble. I can truly say that I have examined every author of emi-

nence within my reach, in the course of composition of the work, and have done my utmost to lay before the student a condensed and yet extensive statement of the present state of the science.

Perhaps I ought to say a word as to the statistics I have given. I would not overrate their importance; at the utmost they only afford an approximate estimate, owing to the drawbacks upon their exactness, and could not alone furnish us with accurate conclusions; nevertheless, I think that their value is considerable, as showing the frequency and relative mortality of the deviations from natural labour, and of the different operations. Whatever value they may possess it is evident will be in proportion to their extent and accuracy; and to secure both these points, I have examined the various reports myself, and obtained access to many but little known in this country.

AUTHOR'S PREFACE

TO THE SECOND DUBLIN EDITION.

I HAVE carefully revised the new edition of this work, thankfully availing myself of the suggestions of all parties so far as I believed them to be right; and although I cannot hope that it is yet free from errors, I am certain their number is considerably diminished.

I have made no change in the principles inculcated in the first edition, because, after a searching investigation and some experience, none has appeared to me to be required; nor in the practice, except to add any recent information which I have obtained.

On one point it will be convenient for me to make a few remarks here rather than in the body of the work. I allude to the statistics. I believe I was one of the first in these countries to endeavour to collect a large body of statistics from all available sources, and to draw certain deductions from them, which I published first in the "Dublin Journal," with a distinct expression of my conviction that the conclusions ought not to be rigorously drawn, but that considerable allowance should be made for disturbing causes.

No one can be more alive than I am to the difficulty of attaining accuracy in the collection of a large number of cases. They are scattered through many volumes, recorded in many forms, requiring arrangement, tabulation, &c.; and even if this be done carefully and correctly, there is still a probability of error in the printing. These considerations should be always borne in mind in estimating statistical tables, and with those who have had much experience, will be a sufficient apology for a certain amount of inaccuracy. I trust it will be found that my former errors have been corrected in this edition.

In a letter to one of the periodicals some years ago, Dr. Francis Ramsbotham objected to the use I made of his father's cases, on the ground that they were selected ones, and that conclusions drawn from them must be inaccurate as regarded the entire of his father's practice, and give a higher rate of mortality than was really the case. I frankly admit the truth of this observation as regards Dr. Ramsbotham, senior, but utterly deprecate any thought or wish of depreciating either his skill or success. I do not see how this can be avoided, unless the whole of his cases were published, or I left them out altogether, which I think would be a great loss. I have only done with his cases what all writers (including Dr. Ramsbotham, jun.) have done with Smellie, Portal, Giffard, and Perfect's cases; and in giving them also, it should always be remembered, that there may be an error of excess or the reverse.

I have already alluded to the errors to which every one is exposed who attempts to collect statistics; let me now mention other causes which, to a certain extent, weaken the conclusions at which we may arrive.

In grouping together a number of cases to ascertain their positive or relative frequency, their causes, the ratio of mortality positive and comparative, &c., it is next to impossible to obtain exactly similar cases, or patients under exactly similar circumstances; for this we have to make allowance, and also for differences in habits of life, constitution, or atmospheric influences, modes of previous treatment, &c., so that we shall find abundant reason to use our statistical deductions with caution and allowance; in fact, we cannot possibly ascertain the exact truth, but only a more or less close approximation to it. But even thus far these calculations are of great value, for,

1. They lead to a habit of definite thought and statement; so that instead of general terms, we use numbers or proportions, and in so far as accuracy is attained, we give a fixed and scientific character to our observations.

2. As Dr. Simpson, in his excellent essay on the value and necessity of statistics in operative surgery, has remarked, "Statistics offer a test by which the impressions of our recorded and limited experience are corrected; and they furnish a mode of investigation capable of resolving many existing practical problems in surgery."

3. They afford us in general the only true and ultimate "measure of value" of any proposed alternative operation, or of any new practice in surgery or midwifery.

For these and other reasons I still hold the opinion that numerical calculations, applied to midwifery, are of great value, notwithstanding the numerous chances of error, and the impossibility of drawing conclusions from them with *absolute* accuracy.

I cannot conclude without expressing my deep sense of obligation to the profession for their kind reception of this work. Feeling the responsibility incurred by even the humblest of those who attempt to teach others, I have shrunk from no amount of labour, and no cost has been spared which could render this volume clear, practical, and useful.

137, Stephen's Green, Dublin.

EXTRACT FROM THE AUTHOR'S PREFACE TO A FORMER AMERICAN EDITION.

"I owe a large debt of gratitude to my kind American friends, which I gladly take this opportunity of acknowledging, and also to the profession in America for the flattering reception they have given to my volumes. No reward could be more highly valued by me, nor could anything make me more anxious, by labour and study, to make my works as perfect as possible, than the knowledge that their usefulness may extend to another hemisphere."

Dublin, November, 1847.

CONTENTS.

PAGE.

PRELIMINARY OBSERVATIONS 33

PART I.

THE ANATOMY OF THE PELVIS AND OF THE ORGANS OF GENERATION.

CHAP.

1. Of the bones of the pelvis 35
2. Of the joints of the pelvis 39
3. Of the pelvis collectively 41
4. Abnormal deviations in the pelvis — Deformities 49
5. Of the external organs of generation 58
6. Of the internal organs of generation 63

PART II.

PHYSIOLOGY OF THE ORGANS OF GENERATION.

1. Physiology of the uterus and ovaries — Menstruation 75
2. Disorders of menstruation 86
3. Generation — Conception 98
4. Utero-gestation 105
5. Signs of pregnancy 145
6. Duration of pregnancy 158
7. Sterility 162
8. Superfœtation 166
9. Extra-uterine pregnancy 169
10. Pathology of the fœtus — Signs of its death 176
11. Abortion — Premature labour 179

PART III.

PHYSIOLOGY OF THE UTERUS. — PARTURITION.

CHAP.		PAGE.
1.	Classification — Definitions	188
2.	Mechanism of parturition	192
3.	Natural labour	210
4.	Convalescence after parturition	226
5.	Tedious labour	236
6.	Powerless labour	250
7.	Obstructed labour	255
8.	Deformed pelvis	268
9.	Obstetric operations — Induction of premature labour	272
10.	Version or turning	290
11.	The vectis or lever	303
12.	The forceps	312
13.	Craniotomy	341
14.	The Cæsarean section	358
15.	Symphyseotomy	370
16.	Mal-positions and mal-presentations	377
17.	Plural births — Monsters	400
18.	Prolapse of the funis umbilicalis	409
19.	Retention of the placenta	414
20.	Flooding	420
21.	Convulsions	435
22.	Lacerations	447
23.	Inversion of the uterus	469
24.	Puerperal fever	477
25.	Phlegmasia dolens	498
26.	Puerperal mania	503
27.	Ephemeral fever or weed	506

LIST OF WOOD ENGRAVINGS.

FIG.		PAGE.
1.	Os Innominatum	35
2.	Ditto	37
3.	Os Sacrum	38
4.	Skeleton of trunk	41
5.	Pelvis—front view	42
6.	" brim	43
7.	" cavity	44
8.	" lower outlet	45
9.	" canal of	46
10.	" equable excess of	49
11.	" " diminution of	50
12.	" distortion of brim	50
13.	" " "	51
14.	" " "	51
15.	" " "	51
16.	" " cavity	52
17.	" " " exostosis	52
18.	" " "	53
19.	" " "	53
20.	" " lower outlet	54
21.	" " "	54
22.	" oblique distortion	55
23.	Calliper for measuring pelvis (Baudelocque's)	57
24.	Measurement of pelvis by the fingers	58
25.	" " "	58
26.	External organs of generation	59
27.	Section of pelvis (Huston)	64
28.	Uterus, tubes and ovaries	65
29.	" cavity of	66
30.	" double	69
31.	" "	70
32.	" "	70
33.	" "	70
34.	Section of ovary, Graafian vesicles	72

FIG. PAGE.
35. Ovum of rabbit 73
36. " of man 74
37. Ovary at menstrual period 80
38. " " " 83
39. Graafian vesicle after impregnation 101
40. Ovary after escape of ovum 103
41. Corpus luteum 103
42. Vessels of gravid uterus 105
43. Nerves of gravid uterus 106
44. Cervix uteri at 3d month of gestation 107
45. " at 6th month 107
46. " at 8th month 108
47. " at 9th month 108
48. Decidua vera 109
49. Decidual cotyledons 110
50. Human ovum of two weeks 112
51. " " laid open 112
52. Placenta and cord 115
53. Human ovum about 3 weeks 125
54. " " 125
55. " 2 months 126
56. " " 126
57. " 3 months 126
58. Section of a hen's egg 128
59. Vitelline membrane, Blastoderma — T. W. Jones 128
60. Changes in the hen's egg during incubation 130
61. " " " " 130
62. " " " " 131
63. Vesicula umbilicalis, from Baer 132
64. " " " 134
65. Diagram of fœtus and membranes about the 4th week, from Carus .. 135
66. " " " " 6th week 135
67. Position of fœtus in utero 138
68. Fœtal head diameters 139
69. Nipple and areola during pregnancy 148
70. Mode of examination by ballottement 152
71. Extra-uterine gestation 171
72. Dewees' wire crotchet 185
73. Bond's placental forceps 185
74. Planes of the pelvis 195
75. " " 196
76. " " 196
77. " " 197
78. " " 198

FIG. PAGE.
79. Planes of the pelvis 198
80. Fœtal head, diameters 200
81. Mechanism of parturition — 1st position 204
82. " " 2d position 204
83. " " 3d position 205
84. " " 4th position 206
85. Head at the lower outlet 207
86. " " 217
87. Internal examination 219
88. Obstructed labour — polypus uteri 259
89. " " ovarian tumour 262
90. " " vaginal cystocele 264
91. Version or turning 299
92. " " 300
93. Roonhuysen's vectis 304
94. Modern vectis 304
95. Application of vectis 310
96. Chamberlen's forceps 314
97. Short forceps 315
98. Long forceps 316
99. Dr. Radford's forceps 317
100. Operation with long forceps 327
101. " short forceps 329
102. Axes of pelvis 334
103. Dr. Huston's forceps 335
104. Dr. Hodge's forceps 336
105. Dr. Bond's forceps 338
106. " " 338
107. " " 338
108. Smellie's perforator 343
109. Crotchet 343
110. Mr. Holmes' perforator 344
111. Knife for amputating limbs 344
112. Blunt hook 345
113. Dr. Davis' bone forceps 345
114. Craniotomy forceps 345
115. The cephalotribe 346
116. Dr. Meigs' Embryulcia instruments 347
117. " " " 347
118. Use of the perforator 353
119. " " 354
120. Application of the Crotchet 355
121. " " 356
122. Face presentation — 1st position 377

FIG.		PAGE
123.	Face presentation — 1st position	378
124.	" 2d position	379
125.	Forehead under the arch of the pelvis	382
126.	Breech presentation — 1st position	384
127.	" " "	385
128.	" " 2d position	386
129.	Breech presentation — extraction of head	389
130.	Presentation of inferior extremities	391
131.	" " "	391
132.	Arm presentation — 1st position	394
133.	" 2d position	395
134.	Compound presentation — hand, foot, and funis	399
135.	Hydrocephalus	407
136.	Prolapse of the funis	409
137.	Placenta prævia	426
138.	Laceration of perineum, Dr. Horner's operation	467
139.	" " " "	467

ON

THE THEORY AND PRACTICE

OF

MIDWIFERY.

PRELIMINARY OBSERVATIONS.

1. The theory and practice of Midwifery includes the anatomy and physiology of the organs of generation, and also the anatomy of the region in which they are contained. A correct knowledge of the structure, magnitude, and other peculiarities of the pelvic cavity is indispensable to a due appreciation of the mechanism of parturition: the anatomy of the organs of generation must of course be preliminary to an investigation into their functions, and it is only by a careful observation of these functions that we are able to detect and understand the deviations from their normal course; in other words, their pathology.

The three great functions of the uterine system are *menstruation*, *conception*, and *parturition*, which are so intimately connected, that each is dependent on the other, and for the development of either, a co-operation of organs is necessary. A breach of this union, or the absence of this co-operation, will give rise to functional irregularity; and together with the individual deviations, and those arising from organic deficiencies, will constitute the pathology of the sexual system.

2. We have thus, in a few words, a natural arrangement of subjects laid down, which we shall follow in the subsequent parts of this volume. Part I. will include the normal and abnormal anatomy of the pelvis, of the external, and of the internal organs of generation. Part II. the function of menstruation, with its abnormal conditions; and of conception, utero-gestation, ovology, &c. with their abnormal deviations, as

sterility, superfœtation, extra-uterine gestation, fœtal pathology, abortion, &c. PART III. Midwifery properly so called,—that is, parturition, with its abnormal varieties.

This arrangement will bring under our notice all that relates to the theory and practice of midwifery.

In addition to the description of the different functions noticed above, there will be appended full details for their management, and for the treatment of their deviations; all which I have endeavoured to give as clearly yet as concisely as possible.

PART I.

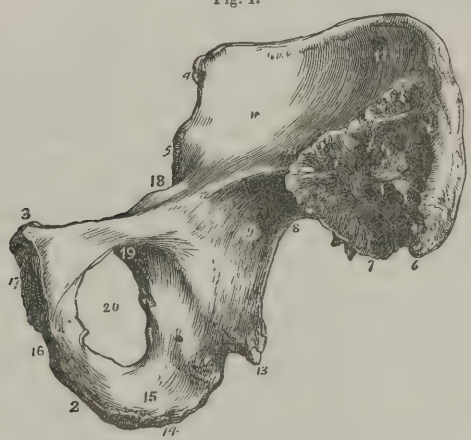
THE ANATOMY OF THE PELVIS AND OF THE ORGANS OF GENERATION.

CHAPTER I.

OF THE BONES OF THE PELVIS.

1. The Pelvis is an irregular bony cavity, situated at the base of the spinal column and above the inferior extremities, with which it is connected by muscles and articulations, and for which, as well as for the muscles of the trunk, it constitutes a "*point d'appui.*"

Fig. 1.



As it forms one of the two mechanical elements of parturition, it is of great importance rightly to understand its component parts, their connexions, relations, coverings, and abnormal varieties. These we shall now proceed to investigate.

2. In the adult, the pelvis may be divided into four parts or bones: viz. two *ossa innominata*, the *os sacrum*, and the *os coccygis;* but in early life they are more minutely divisible.

3. Each Os Innominatum at an early period of intra-uterine life, consists of cartilage only, in which subsequently numerous spiculæ of ossification are seen, and which at birth have coalesced so as to form three bones, separated by cartilage.

After birth, the process of ossification continues until these separate bones meet in the acetabulum, where they are identified with each other, and at the symphysis pubis, where the opposite ossa pubis are united by cartilage and ligaments.

4. The breadth of each os innominatum, from the anterior superior to the posterior superior spinous process, is six inches, and the height, from the tuber ischii to the crest of the ilium, is seven inches.

The three bones into which each is divided at birth have received different names, and require distinct notice.

5. The Os Ilium, hip or haunch-bone (fig. 1), is the larger of the three, of a triangular shape, situated superiorly, and with its fellow forming what is called the false pelvis.

Its *external* surface ([1]), or *dorsum*, is convex, irregular, with elevations and depressions, which serve for the attachment of the glutæi muscles. Its *internal* surface, or *venter* ([10]), is concave and smooth, affording a bed for the iliacus internus muscle. The *lower* portion, body or base ([5]), is the thickest part of the bone, and forms more than one third of the acetabulum. Above the body, the bone spreads out into its *ala* or wing, which rises obliquely forwards, upwards, outwards, and then backwards, terminating in the crest, or *crista ilii*, a semicircular ridge of some thickness, which at its posterior part curves downwards and inwards. Its borders serve for the attachment of the abdominal muscles and certain ligaments to be hereafter described; and it terminates anteriorly, in the anterior superior and inferior spinous processes ([4], [5]), and posteriorly in the posterior superior and inferior spinous processes ([6], [7]). The former afford attachment to Poupart's and Gimbernat's ligaments, the tensor vaginæ femoris, the sartorius, and a portion of the rectus femoris muscles. Between the posterior spinous processes is a deep arch, the *sciatic notch*, which is divided by ligaments into the two *sciatic foramina:* through the upper of these, which is the larger, pass the gluteal, sciatic and pudic arteries, the sciatic and pudic nerves, and the pyriform muscle; whilst, through the inferior opening, the pudic arteries and nerve re-enter the pelvis, and the obturator internus muscle passes out. The posterior part of the crest of the ilium expands and exhibits an irregularly oval rough surface with numerous prominences, which occupy corresponding depressions in the sacrum, and constitute (with a thin layer of cartilage interposed) the *sacro-iliac synchondrosis* of each side. The body of the bone is divided from the ala internally by a well-marked ridge ([12]), running from the junction of the ilium with the sacrum, forward; this is part of the linea ilio-pectinea, and defines the boundary of the true pelvis.

Thus we find that the ilium is connected posteriorly with the sacrum, and identified anteriorly with the ischium and pubis in the acetabulum.

6. The Os Ischium, os sedentarium, &c. is the lower of the three bones composing the os innominatum, and the next in size to the os ilium. Its *base* or body ([2]), which forms the inferior portion of the acetabulum, is the thickest part; below this we find a narrower portion, from which a *spinous process* juts out backwards and inwards, and affords insertion to part of the sacro-sciatic ligament. This process varies in length and direction, and is occasionally of some importance obstetrically. From the neck, the bone descends downwards and forwards, until, enlarging at its lower portion, it forms the *tuber ischii* ([14]), the bony seat, a rough

thick protuberance; and, turning upwards at an obtuse angle, becomes the *ascending ramus* ([15]) of the ischium. Its *internal* surface is smooth and even, and forms one of the *inclined planes* of the pelvic cavity. Its

Fig. 2.

external surface is rough, and gives attachment to the sacro-sciatic ligament, to the semi-membranosus, semi-tendinosus, the long head of the biceps flexor cruris, and the quadratus femoris muscles.

Thus the ischium is identified with the ilium and pubis in the acetabulum, with the descending ramus of the os pubis, and connected by ligament with the sacrum.

7. The Os Pubis, *pecten* or share-bone, is the smaller and most anterior of the three bones. Its *base* is the thickest part, and forms the anterior and smaller third of the acetabulum, beyond which the bone narrows; and, proceeding forwards, constitutes the *horizontal ramus* ([16]) of the pubis; somewhat triangular in shape, and about half an inch in breadth. It meets its opposite at the symphysis pubis ([17]), and completes the anterior wall of the pelvis. From the inferior part of the symphysis, and at an acute angle with the horizontal ramus, a thin plate of bone, the *descending ramus* ([18]), proceeds downwards to meet the ascending ramus of the ischium, and with it to form one side of the *arch of the pubis*. Upon the angle formed by these bones and their opposites will depend the dimensions of the arch, and the facility or difficulty of the transit of the child through the lower outlet.

The inner and superior edge of the horizontal ramus is a continuation of the linea ilio-pectinea, which it completes; and near its pubic termination is a small spinous process, to which is attached the inner end of Poupart's ligament, and near it the pectineus muscle, whilst the inner and outer edges of this portion of the bone, afford insertions to the abdominal muscles. Although I have said that the anterior part of the pelvis is completed by the ossa pubis and ischium, yet in the centre of each side a considerable space is left, called the *obturator foramen* ([20]), which is nearly closed by the obturator ligament. The object attained by this arrangement is, lightness of structure where strength is not needed.

The os pubis is identified with the ilium and ischium in the acetabulum, with the ascending ramus of the ischium; and connected with its fellow opposite by cartilage at the symphysis pubis.

Of the three bones, the ilium forms a part of the brim of the pelvis, but none of the outlet; the ischium, part of the outlet, but none of the brim; whilst the pubis enters into the formation of both brim and outlet.

8. The Os Sacrum, *os basilare*, &c., terminates the vertebral column, and may be said to consist of several vertebræ anchylosed. Its formation commences by about thirty-five points of ossification; these shortly coalesce into fifteen; at birth the number is reduced to five (the number of vertebræ of which the bone consists), and subsequently they form but one bone. In the adult, it is of a triangular shape, the base of the triangle being above, and inclining forwards; the apex below, and somewhat backwards. Its length is from four to four and a half inches, its breadth four inches, and its greatest thickness two and a half inches. M. Baudelocque found that the thickness of this bone scarcely varies a line, even in deformed pelves. Its specific gravity is small, owing to its spongy texture; so that, for its size, it is probably the lightest bone in the body. Its *external* surface is rough and convex, exhibiting four or five *spinous processes* like those of the vertebræ, but smaller, and diminishing in size as they descend. Anterior to these we find a continuation of the *spinal canal*, containing the *cauda equina*, with four holes on each side communicating with it, for the transmission of nerves. Its *internal* surface (2) is smooth, and concave to the amount of half an inch, crossed by four transverse lines, marking the former division of its bones by cartilage: here are also four pairs of holes sloping outwards, through which pass nervous filaments, which afterwards form part of the great sciatic nerve. The upper edge of this bone completes the brim of the pelvis; the oval shape

Fig. 3.

of which, however, is broken by the projection of the central portion,—the *promontory of the sacrum* (1). The lateral *surfaces* (3) are rough, uneven, and covered with a thin layer of cartilage; the irregularities correspond to similar ones in the ilium, and with them form the *sacro-iliac*

synchondroses. This is probably the most important bone in the pelvis, obstetrically considered, inasmuch as it forms a great portion of the brim and cavity, and enters largely into the various deformities of the pelvis.

It is connected superiorly with the last lumbar vertebra, laterally with the ossa ilia, inferiorly with the os coccygis, and by ligaments with the ossa ischia.

9. The Os Coccygis, or huckle-bone (4), is the continuation and termination of the os sacrum and vertebral column. It is formed by four or five points of ossification in the fœtus, which do not afterwards unite, but are tipped with cartilage, and moveable by a ginglymoid joint. The entire bones form a pyramid, the apex of which is below. The *external* surface is irregular, and the *internal* smooth, terminating the plane of the sacrum, and extending it anteriorly. The small sciatic ligament and the ischio-coccygeal muscle are inserted into it.

To the accoucheur, this apparently insignificant bone, or bones, is of importance, as any deviation from its normal direction or usual mobility may influence the progress of parturition.

CHAPTER II.

OF THE JOINTS OF THE PELVIS.

10. Before proceeding to the consideration of the pelvis collectively, let us briefly examine the joints by which the separate bones are connected, and especially as deficient information on this subject formerly led to erroneous practical conclusions. We shall notice, 1, the sacro-iliac synchondroses; 2, the symphysis pubis; and, 3, the sacro-coccygeal joint.

11. The Sacro-iliac Synchondrosis, of either side, consists of a rough irregular surface on the posterior part of the ilium and the side of the sacrum, each of which is covered by a layer of cartilage from one-sixth to one-eighth of an inch in thickness; the sacral layer being the thicker, and the entire, when the bones are forcibly separated, adhering to the sacrum. At the point of junction of these two layers, their substance is somewhat softer, which has led to the erroneous supposition that it is a joint, properly so called. This union of the bones is strengthened by strong ligamentous bands, which by some writers are described as the superior, inferior, anterior, and posterior sacro-iliac ligaments. They stretch across from one bone to the other, in front and behind; rendering the joint perfectly immoveable, unless force be used. Additional firmness also is obtained by the sacro-sciatic ligaments connecting the lower part of the sacrum with the ilium.

12. The mode in which the sacrum is inserted between the ossa ilia is worthy of notice; it resembles the position of the keystone of an arch *inverted*: *i. e.*, its transverse diameter is greater *inside* than *outside*, because the pressure to which it is exposed is from within. The interposition of cartilage is probably for the purpose of diminishing the effect of shocks, and so preserving the integrity of the joint.

13. The Symphysis Pubis is situated anteriorly, and formed by the junction of the two ossa pubis, whose extremities are covered by cartilage, or fibro-cartilage. It was formerly supposed that the junction was effected by the interposition of a single mass of cartilage; but the researches of Dr. W. Hunter led him to the conclusion that the end of each bone is covered with cartilage, and between them, so covered, is a matter resembling intervertebral substance. With this view Baudelocque and Burns agree; but M. Tenon thinks that sometimes the one and sometimes the other mode obtains. Occupying two-thirds of the length, and the posterior third of the centre of this junction, we find a true arthrodial articulation, six lines in length and two in breadth, in shape like an almond, lined by synovial membrane, and containing a small quantity of synovia. M. Gardien defines this joint as "an arthrodial articulation in part, and the remainder a true synevrotic synchondrosis."

14. Though the joint be weak in itself, it is strongly fortified by ligaments. The capsule is strong, and is connected with, or partly formed by, the anterior and posterior pubic and sub-pubic ligaments, which consist of interlacing fibres stretched across the joint on all sides, and firmly attached to each os pubis.

15. Ambrose Parè, Severin Pineau, and other ancient writers, with Sigault, Chaussier, Gardien, &c., among the moderns, judging from its occurrence in certain animals, have concluded that the ossa pubis are separated to a certain extent during labour, and that this joint is a special provision for increasing the antero-posterior diameter of the brim of the pelvis; and certain *post-mortem* examinations, especially of females who died near the full term of utero-gestation, have been adduced as proving the fact. On the other hand, this separation is denied by Denman, Baudelocque, Boyer, Burns, Dewees, &c. Baudelocque and others have sought in vain for it in cases where no violence has been used; and, from a fair estimate of the experience on record, we may conclude that it does not take place as a natural process, but that it occurs occasionally as an accident. The arguments of Dewees are, in my mind, conclusive:— 1. It is not stated to be more frequent in distorted than in well-formed pelves, which ought to be the case on account of the greater pressure. 2. When it does occur, it is attended with severe inconveniences, which are not observed after ordinary labour. 3. That such a separation as has been imagined, would not materially increase the antero-posterior diameter of the brim, as "it would require the ossa pubis to be separated one inch from each other, to gain two lines," and such a separation would rupture the pubic ligaments and the sacro-iliac synchondroses, in many cases, beyond recovery.

16. The Sacro-coccygeal joint is of the kind called ginglymoid, admitting of extensive motion, especially backwards, so as to permit the enlargement of the lower outlet at least one inch. The articulating surfaces are covered with cartilage, and between them is a synovial capsule; whilst on the outside, and entirely embracing the joint, is a fibrous capsular ligament.

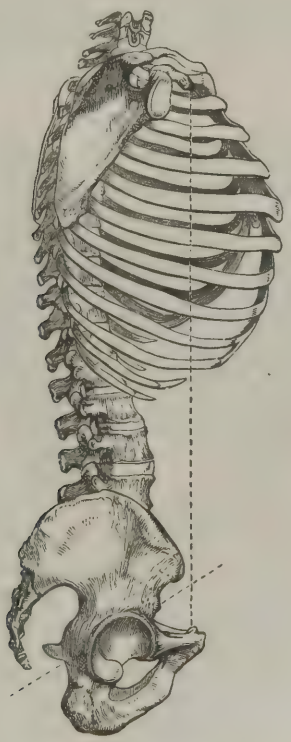
CHAPTER III.

OF THE PELVIS COLLECTIVELY.

17. Having thus examined each bone of the pelvis separately, and the joints by which they are united, our next object is the consideration of the pelvis as a whole, its relation to the rest of the body, its magnitude, axes, &c.

It is connected with the trunk by the articulation of the sacrum with the last lumbar vertebra, effected in the same manner as the junction of the vertebræ with each other; with the lower extremities it is connected by means of the hip-joints.

Fig. 4.



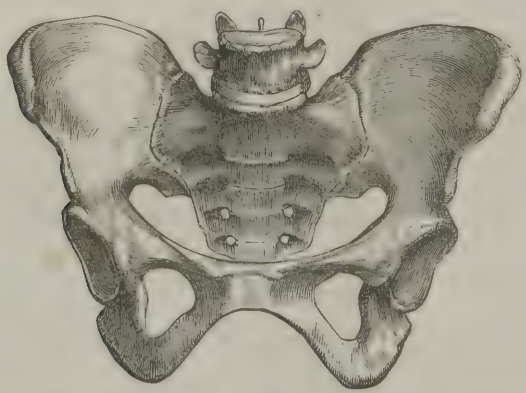
18. But the *position* of the pelvis *in situ* is very different from what we might suppose, from examining it separately. The brim of the pelvis is neither horizontal nor perpendicular, but oblique. When the body is erect, the upper part of the sacrum and the acetabula are nearly in the same descending line. The obliquity has been variously estimated; that of the brim from 35° to 60°, and that of the outlet from $5\frac{1}{2}$° to 18°. Nae-

gelè states the obliquity of the brim to be from 50° to 60°, and that of the outlet from 10° to 11°; the point of the coccyx being seven or eight lines above the summit of the arch of the pubis, and the sacro-vertebral angle three inches nine lines higher than the pubis.

19. The advantages of this obliquity are obvious; as Dr. F. Ramsbotham has truly observed: "Were the axes of the trunk and pelvic entrance in the same line, owing to the upright position of the human female, the womb, towards the close of gestation, would gravitate low into the pelvis, and produce most injurious pressure on the contained viscera; while, in the early months, not only would the same distressful inconvenience be occasioned, but there would be great danger of its protruding externally, and appearing as a tumour between the thighs, covered by the inverted vagina." We may add, that, when not pregnant, the patient would be obnoxious to prolapse of the uterus and the other pelvic viscera, upon making very slight expulsive efforts.

20. Now let us examine the Pelvis itself. It is divided by the linea ilio-pectinea into the false and true, or upper and lower pelvis. The *Upper* or *False Pelvis* is formed by the lateral divergence of the alæ of

Fig. 5.



the ossa innominata. It is not of much importance obstetrically, except for the general relation which its normal size bears to that of the true pelvis, and the inference to be drawn therefrom as to the normal or abnormal condition of the latter. Dr. Burns gives the following measurements, which I believe are correct:—"From the symphysis pubis to the commencement of the iliac wing at the inferior spinous process, is nearly four inches. From the inferior spinous process to the posterior ridge of the ilium, a line subtending the hollow of the costa, measures five inches. The distance from the superior spine is the same. From the top of the crest of the ilium to the brim of the pelvis, a direct line measures three inches and a half. The distance between the two superior anterior spinous processes of the ilium is fully ten inches. A line drawn from the top of the crest of the ilium to the opposite side measures rather more than eleven inches, and touches, in its course, the intervertebral substance between the fourth and fifth lumbar vertebræ. A line drawn from the centre of the third lumbar vertebra, counting from the sacrum to the upper spine of

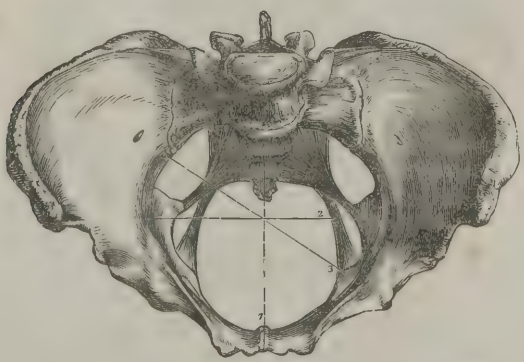
the ilium, measures six inches and three quarters. A line drawn from the same vertebra to the top of the symphysis, measures seven inches and three quarters; and, when the subject is erect, this line is exactly perpendicular."

21. The *Lower* or *True Pelvis* is the part involved in parturition, and which it is therefore essential to know with minute accuracy. For the purpose of description, it is divided into the brim, cavity, and outlet.

22. The Brim of the Pelvis is defined by the linea ilio-pectinea; it is of an oval form, except posteriorly, where it is broken by the promontory of the sacrum. Its influence upon labour will be understood, when we recollect that it is the first solid resistance the head of the fœtus meets; that any diminution in its size is more hazardous and less remediable than in any other portion of the passages; and, lastly, that deviations from the normal proportions of the brim, most frequently entail similar ones in the cavity.

The three principal *diameters* are the *antero-posterior* (1), from the prominence of the sacrum to the inner and upper edge of the symphysis pubis; the *transverse* (2), across the widest part of the brim, at right

Fig. 6.



angles to the antero-posterior; and the *oblique* diameter (3), from the sacro-iliac synchondrosis of one side, to the opposite side of the brim, just above the acetabulum.

23. The measurements of their diameters are not exactly the same in different women, though the variation is but slight. I shall place the measurements given by some of the chief authorities before the reader.

	Denman.	Burns.	Ramsbotham.	Rigby.	Baudelocque.	Velpeau.	Moreau.
Antero-posterior diam'r.	4 in. & a fraction.	4 in.	4 in.	4·3 in.	4 in.	4 in.	4 in.
Transverse	5	5¼	5¼	5·4	5	5	5
Oblique		5⅛	5	4·8	4½	4½	4½

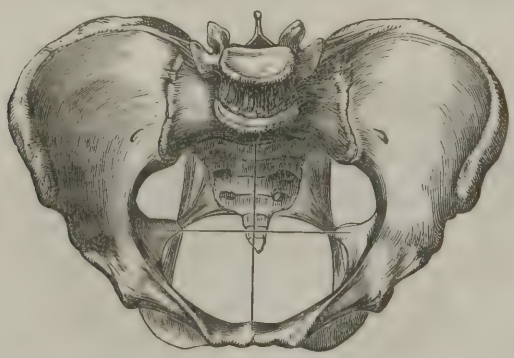
If we take the smallest of these estimates, there will still be space

enough to admit the head of the child; and if we allow half an inch for variations, this will give us a pretty correct idea of the diameters of the brim. The *circumference* varies from thirteen to fourteen and a half inches.

Dr. Burns has added other measurements: — "From the sacro-iliac symphysis to the crest of the pubis on the same side is four inches and a half; from the top of the sacrum to that part of the brim which is directly above the foramen thyroideum, is three inches and a half; the line, if drawn to the acetabulum in place of the foramen, is a quarter of an inch shorter; a line drawn across the fore part of the brim, from one acetabulum to the other, is nearly four inches and a quarter."

24. The Cavity of the Pelvis, whose fixed boundaries are the sacrum, the ischium, and the pubis, is of unequal depth. Posteriorly it measures five inches, or six if the coccyx be extended; from the brim to the tuber ischii, three inches and three quarters; and the depth of the symphysis pubis is from two to two and a half inches.

Fig. 7.



25. The *antero-posterior diameter*, from the hollow of the sacrum to the symphysis pubis, is about four inches and a half; the *transverse*, at right angles with the former, is about four inches and three quarters; and the *oblique* about five inches: a variation of a quarter of an inch either way being allowed.

There are other measurements of considerable importance, inasmuch as the child's head passes obliquely through the cavity of the pelvis. Thus, from the sacro-iliac synchondrosis of one side to the tuber ischii of the other, is six inches; and to the ramus of the ischium, five inches: from the anterior margin of the sacro-sciatic notch, to the opposite side, is six inches, or six and a quarter; from the anterior margin of the descending ramus of the ischium, to the opposite side, at the same level, is four inches and three quarters.

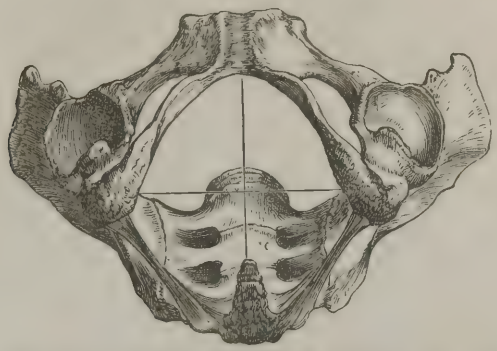
26. The bones which constitute the pelvic cavity are smooth on their inner surface, and present a series of *inclined planes*, calculated to influence the direction of the fœtal head in its descent. They tend at first downwards and slightly backwards, then downwards and forwards.

27. The Outlet of the Pelvis is of an oval shape, but irregular. Its lateral boundaries are immoveable; but its antero-posterior diameter may

be extended, owing to the mobility of the coccyx. The arch of the pubis, according to Osiander, forms an angle varying between 90° and 100°, and will permit the passage of a circular body whose diameter is an inch and a quarter.

28. The *antero-posterior diameter* of the outlet, from the arch of the pubis to the point of the coccyx, is from four to five inches; the *transverse*, from one tuber ischii to the other, is about four inches; and the *oblique*, four inches and three quarters, allowing for a variation of half an inch.

Fig. 8.



29. Now, if we compare the diameters of the brim with those of the outlet, we find that the proportions are completely changed; that which was the shortest at the brim, being the longest at the outlet, and the longest diameter of the brim, being the shortest at the outlet. This remarkable change is, however, effected gradually; for in the cavity we observe merely an approximation in the diameters. The effect of these changes upon the mechanism of parturition are very important, as we shall see by and by.

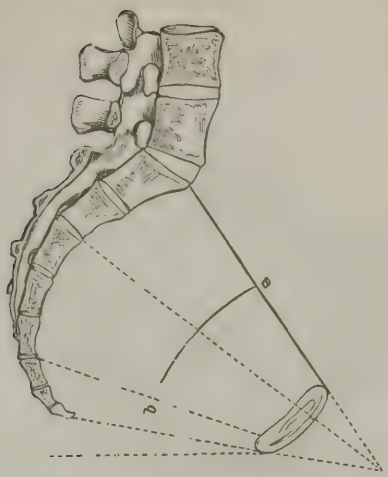
30. The *axes* of the upper and lower outlet of the pelvis form an obtuse angle with each other; the *former* being described by a line running from the coccyx upward to a little above the umbilicus, and the *latter* by a line drawn from the second bone of the sacrum through the centre of the pubic arch.

If we combine these together with the *inclination* of the pelvis, we shall obtain a tolerably accurate notion of the *direction* of the canal of the pelvis. This is marked out by the central line in the following figure, which I have copied from one given by M. Danyau in his translation of Naegelè's work on Oblique Distortion.

31. There is a considerable *difference* between the *male and female pelvis*, both in shape and size. In the former, the brim is more circular, and the cavity deeper. In the male, the depth of the symphysis pubis is nearly double that of the female: the sacrum is more perpendicular; the sacro-sciatic notches and foramina smaller; the arch of the pubis is narrower, its angle being about 70° or 80°; the tubera ischii are nearer to each other, and the coccyx less moveable.

From the greater width of the female pelvis, the acetabula are further

Fig. 9.



apart than in the male, although the thigh-bones approach each other in their descent, and the knees (in the erect position) are nearly in contact, giving a peculiarity to the movements of the female, not observable in the other sex.

32. Hitherto we have considered the skeleton pelvis only; but the subject would be incomplete without a brief description of the *soft parts, lining the pelvis, and covering it externally.* The former modify the diameters of the pelvis, and the latter must be taken into account in forming a diagnosis in the living subject.

The iliac fossæ are each occupied by the iliacus internus muscle, internal to which, and slightly overlapping the edge of the brim, is the psoas muscle; these pass over the anterior part of the brim to their insertions. Near the inner margin of the psoas muscle we find the iliac artery and vein, with the crural nerves and lymphatics. In the cavity we find the obturator internus and the pyramidalis muscles, with the hemorrhoidal and sacral vessels, and the sacral nerves. The rectum passes down nearly in the centre of the sacrum, and the bladder lies behind and above the symphysis pubis: these parts are held *in situ* by cellular membrane, superficial and deep fascia, &c.

The lower outlet is nearly closed by soft parts, which are capable of great distension. On either side of the sacrum and coccyx are situated the sacro-sciatic ligament, the coccygeus muscle, and layers of fascia and cellular substance; whilst the termination of the rectum, and the perineum consisting of transverse muscular fibres, fascia and cellular tissue, close the outlet posterior to the orifice of the vagina.

33. The effect of these additions in diminishing the internal measurements of the pelvis is not very great, except at the lower outlet. The transverse diameter of the brim is diminished about half an inch, or rather more when the psoæ muscles are in action, and the conjugate diameter about a quarter of an inch. The diameters of the cavity are

not lessened more than a quarter of an inch. The lower outlet may be said to be almost closed in the absence of any distending force, the orifice of the vagina being the only vacancy; but the elasticity of the perineum, &c. occasions the soft parts to be little or no diminution of the antero-posterior diameter.

34. To the crest of the ilium the abdominal muscles are attached; and on the outer surface of the ossa innominata, there is a large mass of muscles, — the glutæi, pyriformis, gemellus superior, obturator internus, gemellus inferior, obturator externus, and quadratus femoris; these muscles are separated by fascia, and are covered by a thick layer of adipose tissue and the skin. The anterior wall of the pelvis gives origin to a great number of muscles, most of which have been already enumerated.

35. The *external measurements* of the pelvis are of considerable importance in the diagnosis of deformity, as deviations externally appreciable, will in most cases (though not in all) be found to accompany internal ones. Unfortunately, the data we possess are but few; however, the following, I believe, are correct.

The external antero-posterior diameter of the pelvis, is from 7 to 8 inches.

The external transverse, between the crista ilii of each side, 13 to 16 inches.

From the anterior superior spine of one side to the other, 10 to 12 inches.

From the great trochanter of one side to the sacro-iliac symphysis of the other, 9 inches.

The depth of the pelvis, from the top of the sacrum to the coccyx, from 4 to 5 inches.

In order, from these measurements, to form a sufficiently correct estimate of the internal diameters of the pelvis, we must deduct from them the thickness of the parietes; *i. e.* about three inches antero-posteriorly, and four inches laterally, according to Baudelocque, Navas, and Velpeau. The depth is easily ascertained externally; posteriorly, by taking the the length of the sacrum; laterally, by measuring from the anterior superior spine of the ilium, and dividing by two; and anteriorly, by taking the depth of the symphysis pubis.

It is but fair to add, that doubts have been expressed of the utility and accuracy of these measurements, by Mesdames Boivin and Lachappelle, on account of the varying thickness of the parietes of the pelvis: but, even allowing for this, they appear to me of value as an approximative estimate.

36. In this opinion I am supported by M. Naegelè, who, in his recent work on Oblique Distortion, has pointed out certain external measurements as a means of diagnosis, and has given a careful estimate of forty-two cases. His French translator, M. Danyau, has added to these, eighty cases measured by himself, and the average result is as follows:

1. From the tuber ischii of one side to the posterior superior spinous process of the opposite side, 6 inches 6 lines.
2. From the anterior superior spine of the ilium of one side to the posterior superior spine of the other side, 7 inches 10 lines.

3. From the spinous process of the last lumbar vertebra to the anterior superior spine of the ilium of either side, 6 inches 7 or 8 lines.
4. From the great trochanter of one side to the posterior superior spine of the ilium of the opposite side, 8 inches 2 lines.
5. From the centre of the inferior edge of the symphysis pubis to the posterior superior spine of the ilium of either side, 6 inches 3 or 4 lines.

These measurements are those of ordinary-sized pelves; they will of course vary if the pelvis be unusually large or small: but the utmost variation of No. 1 was 6 lines, of No. 2 was 11 lines, of No. 3 was 7 lines, of No. 4 was 9 lines, and of No. 5 was 9 lines; and these were almost all single exceptions.

37. The next point relates to the practical application of these facts, or, in other words, to the best mode of ascertaining the size of the pelvis in the living subject. A certain amount of information may be obtained from the general and equable form of the pelvis, the breadth of the hips as compared with the shoulders, the degree of obliquity of the pelvis, the curve of the sacrum, &c.; and in many cases we may pronounce, from a cursory glance, that the patient is well made. Should this not be so apparent, we must have recourse to external measurement, which is easily effected by means of a pair of curved calipers and a foot measure. Care must be taken in placing the points of the instrument, as a slight deviation may produce different and incorrect results. The measurements thus obtained we can reduce to the internal diameters of the pelvis by making the deductions already specified.

38. There is greater difficulty in ascertaining the magnitude of the pelvis internally. In Great Britain we are almost limited to the information afforded by the "*toucher;*" and undoubtedly, by this means alone, a well-educated finger may obtain a sufficiently accurate estimate for practical purposes. When making an examination for this purpose, the finger should be passed to the promontory of the sacrum, and thence carried forward slowly to the symphysis pubis: we may then pass it across the pelvis, in the direction of the transverse and oblique diameters, and finally follow the course of the brim, taking note of any deviation from the usual form, or of any obstacle. The state of the sacrum and cavity generally, and the mobility of the coccyx, can readily be ascertained by the finger, as well as the dimensions of the lower outlet. Although deficient in precision, the information thus obtained may satisfy us of the possibility of the passage of the child; and of course, if the patient be pregnant or in labour, there will be more certainty, as we shall then have the child's head as a standard of comparison.

39. But, in order to arrive at greater accuracy, certain instruments have been invented, chiefly by continental obstetricians, for measuring the internal as well as the external diameters of the pelvis. Thus we have the "*compass d'épaisseur*" of Baudelocque, the "*cephanometre*" of Stein, the "*mecometre*" of Chaussier, the "*pelvimeters*" of De Creve, Aitken, Coutouly, Bang, Traisnel, &c., with various modifications of modern invention. I do not deem it necessary to describe these instruments, as they are seldom, if ever, used in these countries. The natural delicacy of the sex precludes their employment in the cases in which they would be of the greatest value; I mean, before marriage, or conception.

CHAPTER IV.

ABNORMAL DEVIATIONS IN THE PELVIS.—DEFORMITIES.

40. Under this title I shall include not merely distortions of the pelvis, but also certain equable deviations from its normal dimensions, which are of importance. The abnormal deviations of the pelvis may be either *general* or *special*. The *general* or *equable deformity* of the pelvis involves the whole of the cavity equally, and may consist either in an *excess* or *diminution* of its usual dimensions.

41. The *former* of these (the *pelvis æquabiliter justo major* of continental writers) is not very unusual, nor is it advantageous in parturition,

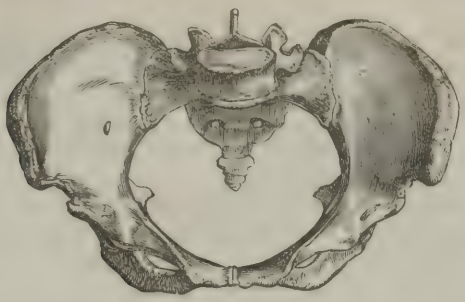
Fig. 10.

except perhaps in face presentations, and it may be attended with inconvenience. Giles de la Tourette has recorded one where the antero-posterior diameter was five inches and a half, the transverse six and a half, both diameters of the lower outlet five and a half, and the distance between the crests of the ilia twelve and a half inches. Dr. Burns mentions his having a very large one, but not quite equal to the one just mentioned. My friend Dr. Murphy possesses one of about the same size. The relative proportion of the diameters sometimes varies, so that the brim may assume an oval shape antero-posteriorly, or a heart shape, and still all the diameters be excessive.

42. It is evident that a pelvis preternaturally large may be a disadvantage to a female who is not pregnant, as it will favour prolapse of the pelvic viscera; and also to one who is pregnant, by more readily permitting descents, displacements, &c. Its inconvenience during parturition consists in the want of that degree of contact with the head of the child, necessary to impress upon it the usual partial rotations and changes of direction; and the facility with which it would admit of prolapse of the womb afterwards.

43. It is more rare to find a pelvis whose size is equably *diminished* (the *pelvis æquabiliter justo minor*), without much relative disproportion between its diameters, although Naegelè and Velpeau think it more com-

Fig. 11.



mon than writers in general have supposed; and, in support of this opinion, it may be added, that modern investigations have discovered that in many, if not most cases of rickets, even where there is no apparent distortion of the pelvis, there is a certain diminution (one-fourth, I believe) in the aggregate diameters. The obstruction which this deformity offers to delivery is sufficiently obvious.

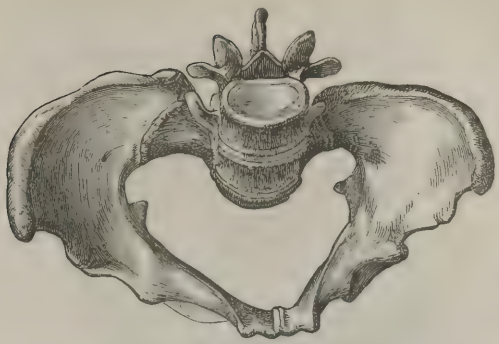
44. The *special distortions of the pelvis* are much more frequent. They occur at the brim, in the cavity, or at the lower outlet, but are rarely limited to one of these situations. The distortion may also occur in any of the diameters, though the antero-posterior diameter of the brim, and the transverse of the lower outlet, present them most frequently.

Fig. 12.

45. *At the brim* we find distortions more common in the antero-poste rior diameter, as I have said; next in the oblique, and lastly in the transverse diameter.

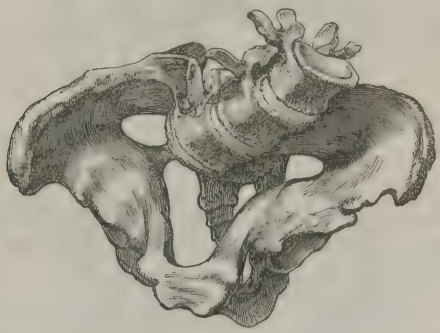
The sacrum may be pushed forward toward the symphysis, or the symphysis toward the sacrum.

Fig. 13.



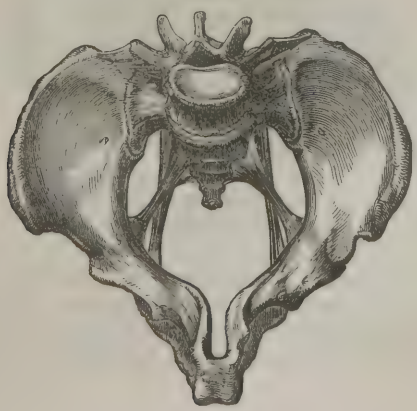
If the sacrum be more slightly pressed forward, it will make the opening a heart shape, and may change the length of the oblique as well as the antero-posterior diameters.

Fig. 14.



In some cases the acetabula are pushed inwards, as well as the sacrum forwards, diminishing the oblique and antero-posterior diameters, and

Fig. 15.



completely distorting the brim. This was the case with Isabel Redman, operated upon by Dr. Hull; and similar examples are recorded by Weidmann, Aitken, Mad. Boivin, &c.

In other cases, the oval of the brim is transposed, the long diameter being antero-posterior instead of transverse; as in the accompanying drawing, (fig. 15.)

46. *In the cavity*, distortions are in most cases consequent upon those of the brim or outlet; though we occasionally meet with instances where the sacrum is too much or too little curved, when the other parts of the

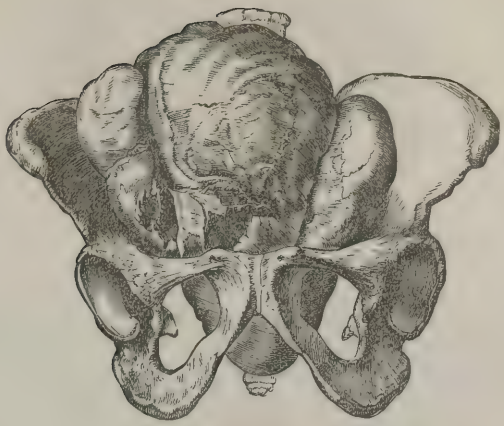
Fig. 16.

pelvis are of normal form. In some very rare cases, the cavity contracts gradually from the brim to the outlet, forming what has been called a "funnel-shaped pelvis."

Fig. 17.

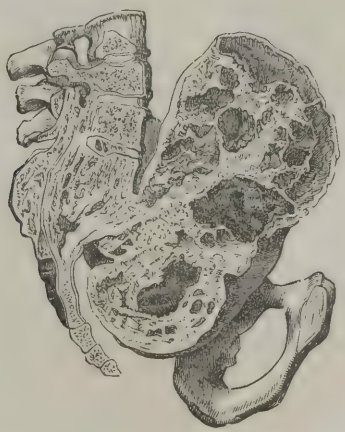
The capacity of the cavity may also be diminished by a fibrous or bony growth from the sacrum, as in the annexed figures. The first (fig. 17) is comparatively small, though sufficient to interfere seriously with labour; but the second (fig. 18) would preclude the possibility of delivery "*per*

Fig. 18.



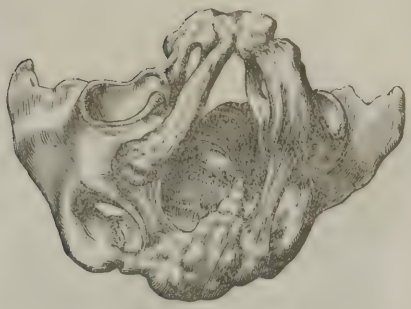
vias naturales." These morbid growths from the periosteum, or bone, involve the same difficulty as distortions, inasmuch as they are incompressible and immoveable.

Fig. 19.



47. *The lower outlet* is comparatively independent of the brim and cavity. It is by no means uncommon to experience delay, arising from a narrowing of the brim, with a rapid passage of the head through the outlet; but, of course, in extreme cases of distortion the outlet participates, as is shown in the figures annexed; fig. 20 being the lower outlet of fig. 14, and fig. 21 of fig. 16. On the other hand, distortions of the lower outlet may occur with a normal shape and size of the brim. They

Fig. 20.



are most frequent in the transverse diameter, owing to the approximation of the tubera ischii, which at the same time will diminish the span of the arch of the pubis, and so effectually, though not apparently, shorten the

Fig. 21.

antero-posterior diameter. The other way in which the latter diameter is lessened, is by too great a curve forward of the lower part of the sacrum and coccyx, and by the anchylosis of the coccygeal joint. The spinous process of the ischium may offer some obstruction, if it be unusually long, and curved inwards.

48. The *amount* of these distortions varies as much as possible: it may be so slight as merely to retard delivery; or it may be so great as to preclude it altogether, as in Mr. Bell's case, where the antero-posterior diameter was about half an inch, or in that recorded by M. Naegelè, in which it was even less.

49. In most cases of pelvic deformity, the distortion is somewhat unequal, one side suffering more than the other; but there is a class of cases in which this distortion is almost entirely confined to one side. An allusion to such will be found in several authors; but it remained for M. Naegelè to add to his high reputation by a careful and accurate descrip-

Fig. 22.

tion of this *oblique distortion* ("*die schräg verengte becken*," or "*pelvis oblique ovata*"). In these cases (fig. 22), the affected side is flattened, and the sacro-iliac synchondrosis anchylosed. Half the sacrum is imperfectly developed; and the other, though at first sight it appears well-formed, is found to be awry: the promontory of the sacrum and the symphysis pubis are not (as they ought to be) opposite to each other, but the former leans to the affected side, and the latter is pushed over (as it were) to the sounder side, so as to make the form of the pelvis oblique.

50. As we should expect, the *planes* and *axes* are altered more or less in all well-marked cases of distortion. When the promontory of the sacrum projects, the axis of the upper outlet is more horizontal; but, if the acetabula are pressed inwards, it may become more perpendicular. The axis of the lower outlet may be changed in the opposite, but more frequently in the same direction, the two becoming almost parallel: nay, there is a case quoted by Velpeau in which they were reversed; that of the lower outlet looking forward, whilst that of the brim was directed backward. In the majority of cases, I believe we may say, that the planes and axes of both outlets approximate to the plane of the horizon.

51. The principal *causes* of distortion are, 1, rickets in infancy and childhood; and, 2, malacosteon, or mollities ossium, in adults. The effect of both diseases is to deprive the bony structure of the earthy matter which gives it firmness; in the absence of which, the bones become flexible, and are influenced by muscular motion, or long-continued pressure. Thus, if in such circumstances the patient maintain the sitting posture long, the promontory of the sacrum may be pushed forwards, or the symphysis upwards; the lower part of the sacrum may be too much curved, and the os coccygis rendered horizontal. If the upright position be continued long, the acetabula may be pressed inwards, and the promontory of the sacrum forwards. If the patient lie much on her back, the sacrum may be flattened; or if on one side, it may be rendered unequal.

Besides these special deformities, it has already been mentioned, that, in patients affected with rickets, the aggregate of the diameters of the pelvis is lessened one-fourth, even when the pelvis is *apparently* unaffected.

52. Any of these special distortions may occur in the same way in adults affected with malacosteon, and at any period of their life; so that it has happened that a female, who had borne children naturally, has at a subsequent labour exhibited such an extent of pelvic distortion as required the use of instruments, or the Cæsarean operation.

Both diseases appear to be more frequent in manufacturing towns than in country districts.

53. It is extremely difficult to assign the cause of oblique distortion. Naegelè states that he could detect no traces of rickets or mollities ossium in any of his cases, nor had any suffered from external violence. The bones presented the same appearance as those of healthy young females. Dr. Rigby, however, thinks that ulcerative absorption must have existed at the sacro-iliac junction, probably in early life.

54. I have already mentioned as a cause of deformity, 3, exostosis; and may further add, 4, fractures of the pelvis, and, 5, inflammation of the sacro-coccygeal joint, terminating in anchylosis, upon which it is unnecessary that I should dwell.

55. The *diagnosis* of distortion is easy in proportion to its amount. If the pelvis be much deformed, it may be detected by an external or internal examination, and estimated with sufficient accuracy for practical purposes. But if it be only slightly affected, it will not be so easy to decide upon the possibility of the passage of the child, unless we have the head of the child, to compare with the pelvis. Without this, we must chiefly depend upon a comparison of the external measurements with those of a well-formed pelvis, and upon the information afforded by a careful internal examination. From these sources, an experienced practitioner will probably obtain data for a satisfactory though cautious diagnosis. But if we are not consulted until the patient be in labour, our task will be comparatively easy, because the head will be in apposition with the part (brim, cavity, or outlet) where we suspect the narrowing.

56. Oblique distortion may be detected in two ways, according to M. Naegelè: 1, by dropping a line perpendicularly from the spinous process of the last lumbar vertebra, and another from the symphysis pubis;—when the pelvis is well formed, these two lines are exactly one behind the other; but when it is obliquely distorted, they are parallel, with a considerable interval: 2dly, by measuring the pelvis externally, in the way described in § 36, we find that there is always a difference between the two sides of the pelvis, varying from one to two inches. To give an example in a pelvis affected with oblique distortion of the left side, the measurement No. 1 (see § 36) was

	6	in.	11	lines	on the left side, and	5	in.	8	lines	on	the	right.
No. 2,	7	"	9	"	" "	6	"	10	"	"	"	
No. 3,	6	"	6	"	" "	5	"	3	"	"	"	
No. 4,	9	"	0	"	" "	8	"	0	"	"	"	
No. 5,	6	"	11	"	" "	6	"	1	"	"	"	

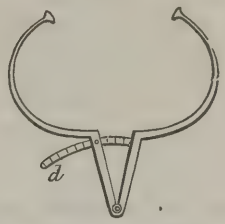
Let the reader compare these with the measurements of a well-formed pelvis, as already given, and he will be convinced that either method, or the two combined, will afford fair grounds for a diagnosis.

Anchylosis of the sacro-coccygeal joint will be discovered by its immobility when pressed by the finger during the internal examination.

The effect of the different kinds and degrees of deformity upon the mechanism of parturition, and the practical considerations upon which the management of such cases must be founded, will be discussed in the Third Part of this work.*

* In a great majority of the cases of reduced or distorted pelves, the degree of deviation from the natural standard, although perhaps sufficient to cause great difficulty in delivery, is nevertheless too small to be readily detected by the external measurements pointed out by the author. The calliper, or "Le compas d'épaisseur de Baudelocque," (fig. 23,) so much relied on by some, is only calculated for measuring the antero-poste-

Fig. 23.



rior diameter, and its indications are not always to be depended on here. In experienced hands, it will afford important but not conclusive testimony as to the probable distance between the promontory of the sacrum and the symphysis pubis. The manner of accomplishing this is to place the patient on her side on the bed, and then, separating the thighs, the extremity of one branch of the instrument is applied to the first spinous process of the sacrum behind, and the opposite extremity upon the middle of the symphysis in front: the intervening space is shown by the scale (*d*), and ought to be full seven inches. By deducting half an inch for the thickness of the pubis, and two and a half inches for the sacrum, four inches remains as the probable antero-posterior diameter of the upper strait, or brim. The oblique diameters are also measured by the same instrument. Placing one of its ends upon the external surface of the great trochanter, and the other on the projecting portion of the opposite sacro-iliac junction, in a well-formed pelvis, we should have about nine inches of separation. Allowing two and three quarter inches for the trochanter, neck of the femur, and acetabulum, and one inch and three quarters for the posterior symphysis, leaves four inches and three quarters as the oblique diameter. But this measurement, for obvious reasons, is less to be relied on than the first; in fact, two occasions of error exist, more or less, in both; viz., 1, In fixing the extremities of the instrument exactly on the right points; and, 2, the variations that occur in different individuals, in the thickness of the bony walls of the pelvis, and especially of the soft parts covering them. In ordinary or well-formed pelves these difficulties are not great, it is true; but when much malformation exists, they are sufficient to destroy all confidence in the accuracy of the results. In figure 21, page 54, for instance, the instrument, properly adjusted, would indicate a full-sized antero-posterior diameter, although in reality the space which is available for the passage of the child is extremely small.

A careful examination with the hand, applied along the lumbar column, the sacrum, and coccyx, and over the arch of the pubis, observing the angle formed by these parts, one with another, and, in short, their general form and proportions, will convey to one well acquainted with their normal state a more satisfactory opinion than any instrument that has yet been invented.

But there may be exostoses or other tumours within the pelvis, very seriously affecting the space, and totally undiscoverable by external examination, so that, for all certainty, internal investigation alone can assure us of the true condition of the parts. The pelvimeters of Coutouly, Mad. Boivin, and others, for internal admeasurement, have been found painful, inconvenient, and uncertain, and are now, at least in this country, entirely discarded; the only instrument here employed for such explorations is the finger; — as justly observed by a late continental writer, "It is the best and surest of all pelvimeters."

The manner of making this examination is thus described by Chailly: "To appreciate the extent of the antero-posterior diameter of the superior strait, the index finger should be passed in the vagina in the axis of the inferior strait, towards the sacro-vertebral angle, the radial side of the finger being applied immediately under the pubis. If the

CHAPTER V.

OF THE EXTERNAL ORGANS OF GENERATION.

57. We may now proceed to describe the generative organs in the female. These are ordinarily divided into the *external* and *internal*, or, with regard to their functions, into the *copulative* and *formative*. The external, or copulative, consist of the mons veneris, the labia majora and minora, the clitoris, the hymen, and the vagina. The internal, or formative, consist of the ovaries, the Fallopian tubes, and uterus. Most English writers place the vagina among the internal organs; but, as it belongs to the copulative, I have classed it with them: the point is of little importance. There is a striking analogy between the male and female organs, except as to situation; and, at an early period of fœtal life, the

end of the finger does not touch the sacro-vertebral angle, it is because the diameter is of normal dimensions; or, if it is contracted, that the degree of contraction is so small that parturition will not be materially affected by it. But, if the finger readily touches the sacro-vertebral angle, there is reason to apprehend more or less difficulty. To measure, in this case, the extent of the sacro-pubic diameter, it is necessary to mark, with the nail of the index finger of the other hand, the finger introduced, directly below the pubis, the labiæ and nymphæ being carefully separated for the purpose; on withdrawing the finger, the length of the part introduced may be readily measured with a graduated scale.

Fig. 24.

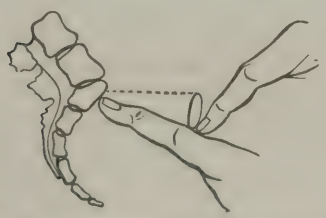


Fig. 25.

"Some little allowance is to be made for the length of the oblique line represented by the finger, which, instead of passing directly to the centre of the pubis, falls under it.

"With the finger we can easily discover whether the concavity of the sacrum is augmented or diminished, which will enable us to determine whether the antero-posterior diameter of the excavation is deranged.

"The antero-posterior diameter of the inferior strait may be ascertained in the same manner as the corresponding diameter of the upper strait: the end of the forefinger being placed on the extremity of the coccyx, the hand must be raised until the radial edge of the finger touches beneath the pubis; being marked at this point, it can be measured as before described.

"The finger thus introduced enables us at the same time to judge of the flexibility or otherwise of the sacro-coccygeal joint."* There is indeed very little difficulty in ascertaining accurately the diameters of the inferior strait with the fingers externally applied.

During labour, the internal examination of the pelvis is greatly facilitated by the relaxed condition of the internal parts; and, if necessary, the hand may be introduced for the purpose. — Editor.

* L'Art des Accouchemens, par Chailly, 175—189.

sex cannot be distinguished. In the present chapter we shall notice the external organs.

Fig. 26.

58. The Mons Veneris is the triangular cushion-like prominence at the lower part of the abdomen and upper part of the symphysis pubis. It consists of a thick layer of adipose tissue underneath the skin, upon which at puberty a quantity of hair makes its appearance. In the cellular tissue is lost the round ligament, and there is sometimes a small pouch of peritoneum. The skin is plentifully supplied with sebaceous glands.

The *use* of this cushion is not very evident.

59. *Abnormal deviations.*—Occasionally the growth of hair is excessive In one case Dr. Davis found it necessary to destroy it on account of the itching it caused.

This part is also the seat of cutaneous eruptions and abscess.*

60. The Labia Majora *vel* Externa are two folds of skin externally, and mucous membrane internally, continued downwards from the sides of the mons veneris to the fourchette. Their junction superiorly constitutes the anterior commissure of the vulva, and they enclose the external organs of generation. Their breadth and thickness are greatest superiorly, gradually decreasing until they disappear near the fourchette. Superiorly they are in contact, but they are separated posteriorly. The external labia contain (between the skin and mucous membrane) subcutaneous fascia, adipose and cellular tissue, nerves, and bloodvessels. Externally they are thinly covered with hair, and thickly studded with sebaceous follicles.

Their *use* is to protect the sensitive organs contained between them, and at the time of labour to facilitate the distension of the external orifice.

61. *Abnormal deviations.*—These are chiefly, 1, excessive growth, attended with mechanical inconveniences; 2, inflammation and abscess; 3, cutaneous eruptions and pruritus; 4, encysted tumours, hernia, &c.

62. The Labia Minora or Nymphæ are two lateral folds of mucous membrane, internal to the labia majora, with which they are in contact externally, and by which they are covered, in the adult. They extend

* It would be inconsistent with the object of a work like the present, to enter into details upon the various diseases to which the parts are subject; I must therefore content myself with enumerating them, and refer my reader to my work on Diseases of Females.

from the anterior commissure of the vulva, to about the middle of the orifice of the vagina, and contain between their mucous coats a spongy vascular tissue and nerves. They enfold the clitoris, the meatus urinarius, and part of the vaginal orifice. In young persons they are firm and elastic, but in old age they become flabby and loose.

They doubtless contribute, with the labia majora, to maintain the integrity and sensibility of the parts they cover.

63. *Abnormal deviations.*—The nymphæ are obnoxious to inflammation, follicular ulceration, and hypertrophy, either congenital or the result of disease.

64. The Clitoris is the analogue of the penis in the male; it consists of two corpora cavernosa, which arise from the rami of the ischia and pubis, and unite on the symphysis pubis. It possesses two muscles analogous to the erectores penis, and terminates in a gland covered by a prepuce, but which is imperforate. The clitoris projects about the eighth of an inch, and is situated just below the point of junction of the nymphæ. It is extremely sensitive, capable of erection, like the penis, and is said to be the seat of sexual pleasure. In the fœtus it is disproportionately large, but it does not increase afterwards in proportion to the surrounding parts.

65. *Abnormal deviations.*—The clitoris may vary in size from congenital malformation or disease; but the researches of M. Parent Duchatelet have disproved the opinion that it enlarges from frequent sexual indulgence; nor, according to the same authority, does its excessive development entail extreme sexual desire.

The organ may be attacked by inflammation, or by malignant disease. Bartholin relates the case of a courtesan whose clitoris was the seat of calcareous deposition.

66. Below the clitoris there is a smooth triangular space, the Vestibulum; at the lower part of which we find the Orifice of the Urethra, or Meatus Urinarius, just at the upper edge of the orifice of the vagina. The exact situation of this opening is important, because we are frequently called upon to introduce the catheter, and, in ordinary cases, it should be done without exposure. The operation is not difficult; the patient being placed on her back, and the labia being separated, the point of the forefinger of the left hand should be placed just within the orifice of the vagina, so as to press slightly its upper edge; the catheter should then be passed along the inner surface of the finger, until it reaches the vestibulum near the edge of the vaginal opening; when there, a very slight movement will cause it to enter the meatus urinarius. Or, the patient may be placed on her left side, in the ordinary position for labour, and the finger carried from behind forward to the vestibulum; the catheter should then be passed along the finger in the direction of the axis of the outlet, and, on reaching the vestibulum, a slight movement will detect the orifice. The operation is more difficult when the parts are swollen or distorted, as happens occasionally from disease, during pregnancy or labour, and after delivery; and if we cannot detect the orifice by the touch, we must of course use a light; and then, for obvious reasons, it is better that the patient should be placed on her side.

The orifice is round, though its sides are usually in contact, and its edges are somewhat thickened.

67. The URETHRA is a membranous canal about an inch or an inch and a half in length, dilatable, and directed obliquely from before, backwards; and from below, upwards; running under and behind the symphysis pubis, from which it is separated by loose cellular tissue. Internally it opens into the bladder. Its direction is subject to variation; during pregnancy, the bladder being carried upwards with the uterus, the urethra curves under the pubic arch, and then ascends perpendicularly. The same change occurs when the uterus is enlarged from other causes. In prolapse of the pelvic viscera its course is reversed. These changes should be borne in mind when catheterism is required.

68. Immediately below the orifice of the urethra, we find a much larger opening, of about an inch in diameter, the ORIFICE OF THE VAGINA. Its sides are in contact ordinarily, but it is capable of enormous distension, and of again returning to its natural size. The opening is closed inferiorly in infants, by a fold of mucous membrane of a crescentic shape, the concavity looking upwards, and which is called the HYMEN. This membrane is easily destroyed, or it may become so relaxed as scarcely to be perceptible, which will account for its rarity in adults. It was formerly held to be peculiar to the human female; but the researches of MM. Duvernoy, Cuvier, and Steller have proved its existence in many animals. From very early times it has been made the test of virginity, its absence being considered conclusive proof of sexual intercourse having taken place; and the fate of the wives of Henry VIII. is an extreme instance of the injustice to which this opinion led. Modern investigations have proved, not only that it may be destroyed by many causes unconnected with sexual indulgence, but that intercourse may take place, followed by pregnancy, without its destruction. It is, therefore, of no value as a test.

69. *Abnormal deviations.*—The principal ones are the following: 1, It may be unusually thick and strong, so as to preclude intromission; 2, instead of the single opening superiorly, it may be pierced with several small holes; 3, instead of the usual form, the hymen may consist of a single or double bridle stretching across the orifice of the vagina; 4, it may be imperforate, and close the vagina completely. Examples of each kind may be found in works on midwifery. These abnormal deviations are of importance only as they may prevent sexual connexion, or impede the natural discharges or delivery; and, once discovered, they are easily remedied.

70. The CARUNCULÆ MYRTIFORMES are four or five small tubercles, which in most females occupy the situation of the hymen, of which they are considered the "debris," by most anatomists; others, however, suppose them to be small duplicatures of the mucous membrane of the vagina. They may possibly facilitate the distension of the orifice of the vagina by unfolding.

Abnormal deviations.—Occasionally they are greatly hypertrophied.

71. The parts contained within the vulva are abundantly supplied with nerves, owing to which, and to the extreme delicacy of their texture, they possess great sensibility. This explains the severe pain which accompanies even trifling diseases of these parts; and it is merely a repetition of the fact observed in other mucous membranes, viz., that they acquire their highest point of sensibility near their junction with the skin.

72. The Fourchette is the posterior commissure of the vulva, and the anterior border of the perineum; it is formed by the union, posteriorly, of the labia. It consists of a fold of mucous membrane, meeting externally the skin of the perineum, and is frequently torn in first labours.

73. The Perineum is the name given to the space between the fourchette and the anus. It is of a somewhat triangular shape, and its medium breadth, in women who have not borne children, is from an inch to an inch and a half. It is narrower, of course, in those who have had children. In the centre, a prominent line may be observed, running antero-posteriorly, called the "*raphe*." The perineum is composed of various tissues: externally there is the skin, then adipose and cellular tissue, fascia, a portion of the constrictor vaginæ, levator ani, transverse and sphincter muscles; besides which, it contains the superficial and transverse arteries, veins, nerves, and lymphatics. Very few hairs grow on this part.

The *use* of the perineum is obvious: it closes the lower outlet posteriorly, so as to prevent the displacement of the pelvic viscera; whilst it admits of distension when necessary, and, by its elasticity, speedily resumes its former condition.

74. *Abnormal deviations.* — The perineum is sometimes unusually broad, increasing the risk of its laceration during labour; or it may be very narrow, and so afford inadequate support to the super-imposed viscera. It may be torn in various ways during labour, as we shall see hereafter, and either not unite, or present the cicatrices of former lacerations. It is sometimes the seat of hernia, according to Smellie, Mery and Curade.

75. The Vagina is a musculo-membranous canal, extending from its orifice in the vulva (§ 68) obliquely through the cavity of the pelvis to the uterus. It passes upwards from the vulva behind and below the urethra and bladder, between the ureters, and anterior to the rectum, describing nearly the line of the canal of the pelvis (§ 30). Its form is cylindrical, somewhat flattened superiorly; but, when quiescent, its parietes are in contact. Its dimensions vary according to age, and other circumstances; for instance, it is proportionately longer in the fœtus than in the child. In some individuals it is very long, in others very short. Dr. Dewees mentions a case where it was only an inch and a half long, and I have met with others nearly as short. It is also longer and narrower in virgins, than in those who have borne children. Ordinarily, it is about six inches in length, by one in width.

The proper tissue of the vagina is dense, and of a grey pearly colour, resembling in some degree fibrous tissue, and about a line and a half in thickness anteriorly, though less near the womb. It is well supplied with vessels, which are multiplied and interlaced so much towards its anterior extremity as to constitute a kind of erectile tissue, which has received the name of *plexus retiformis*. Internally, the vagina is lined by mucous membrane of a pink colour, continued from the vulva, and which near the orifice, and there only, possesses great sensibility, except when it is the seat of inflammation, and then the whole canal is very tender. The mucous coat is disposed in the form of transverse rugæ, anteriorly and posteriorly, which, by unfolding, permit the distension of the vagina.

From the "*cul de sac*," at the inner extremity of the vagina, the mucous

membrane is reflected down upon the projecting cervix uteri, and in this situation is thickly studded with small glandular follicles. In addition to its proper tissue and mucous coat, the vagina has some muscular fibres surrounding its orifice, which have received the name of constrictor vaginæ, and which serve to contract the orifice, and to draw down the clitoris. The vagina, in common with the vulva, is abundantly supplied with blood-vessels from the internal iliac arteries, and with nervous filaments from the pudic nerves. The lymphatics, which are very numerous, are derived from the hypogastric plexus. The *use* of the vagina is two-fold; first, for copulation, and, secondly, for the transmission of the fœtus; and, to facilitate the latter process, the inner membrane, which in its ordinary state secretes just enough mucous to lubricate its surface; during labour, secretes it most profusely.

76. *Abnormal deviations.* — The vagina varies much in length, as already stated; its width differs equally in different subjects; it may be so narrow as to render intercourse difficult and painful; its exit may be closed by the hymen, or by a membrane higher up; its sides may be adherent, or the seat of cicatrices and callosities; or it may be altogether wanting. Of course, occlusion or absence of the canal will prevent the escape of the menses, and render copulation impossible, constituting one cause of sterility; but, though a partial closure may impede intromission, it does not render impregnation impossible. I may add, that the narrowness or width of the canal is no proof of virginity, or the contrary. M. Parent Duchatelet states, that in many of the youngest prostitutes of Paris it was wide and dilated; whilst in others, who had followed their degrading "*métier*" for twenty years, it might have been mistaken for the vagina of virgins. Dr. Montgomery mentions, what most practitioners must have observed, how very quickly, after delivery, the vagina recovers its usual size and tone.

The vagina is also obnoxious to attacks of inflammation, and its consequences; to lesions of nutrition and malignant diseases.

CHAPTER VI.

OF THE INTERNAL ORGANS OF GENERATION.

77. According to the arrangement proposed, our next subject is the *formative* or *internal* organs of generation; but, before we proceed to take them in detail, it will not be unprofitable, to direct the attention of the student to the relative situation of the pelvic viscera, as shown in the accompanying engraving.

Proceeding from before, backwards; we find the urethra passing in an oblique direction antero-posteriorly, and from below, upwards, under the arch of the pubis, and then merging in the bladder, which, when distended, rises about half its height above the symphysis pubis. Below the urethra, but with an interval between them, is the vagina, running its oblique course to the os uteri, which is a little above the level of the pubes. The position of the uterus is not vertical, but inclining a little forward, with its fundus above the level of the bladder. The peritoneum is reflected

from the abdominal parietes, on the fundus and posterior wall of the bladder down to the level of the cervix uteri; from whence it passes over the anterior surface, fundus, and posterior surface of the uterus, down to about an inch below the level of the os uteri; and from thence it is reflected upon the rectum. The latter organ lies between the uterus and the sacrum, and a little to the left side of the uterus. I do not, of course,

Fig. 27.

mean that this exact position of the part never varies, but the sketch I have given is sufficiently accurate for practical purposes; and it is very important for the practitioner to be acquainted with the position and elevation of the pelvic viscera.

We may now pass on to the description of the uterus, fallopian tubes, and ovaries.

78. The Uterus is the receptacle provided for the nutrition, maturation, and, ultimately, for the expulsion of the fœtus. It is the largest of the generative organs, and is peculiar to the human female, though there is an approach to such an organ in the mammalia. It is a hollow symmetrical viscus, in shape somewhat triangular or pyramidal, resembling a flattened pear, but rounder posteriorly than anteriorly; situated, as we have just seen, in the centre of the pelvis, behind the bladder, above the vagina, below the small intestines, and in front of the rectum. For the convenience of description, anatomists ordinarily divide it into the *fundus*, or that part above a line drawn from the orifice of one fallopian tube to the other, the *cervix*, or the narrow and inferior part; and the *body*, or that part between the fundus and cervix. Dewees maintains that the cervix differs essentially, in structure and function, from the rest of the uterus; and it is certain that its structure is more dense, less vascular, and that the menses are not excreted by this part. In the unimpregnated state it projects into the vagina about half or three quarters of an inch, the anterior lip being the lower.

79. The uterus gradually assumes its normal form during fœtal and infantile life. Dr. Rigby remarks, "It is at first divided into two cornua,

and usually continues so to the end of the third month, or even later; the younger the embryo, the longer are the cornua, and the more acute the angle which they form; but even after this angle has disappeared, the cornua continue for some time longer. The uterus is at first of an equal width throughout; it is perfectly smooth, and not distinguished from the

Fig. 28.

vagina either internally or externally by any prominence whatever. This change is first observed when the cornua disappear and leave the uterus with a simple cavity. The upper portion is proportionably smaller, the younger the embryo is. The body of the uterus gradually increases, until at the period of puberty it is no longer cylindrical, but pyriform; even in the full-grown fœtus the length of the body is not more than a fourth part of the whole uterus, from the seventh to the thirteenth year it is only a third, nor does it reach half until puberty has been fully attained. The os tincæ, or os uteri externum, first appears as a scarcely perceptible prominence, projecting into the vagina." "The parietes of the uterus are thin in proportion to the age of the embryo. They are of equal thickness throughout, at first; at the fifth month, the cervix becomes thicker than the upper parts; between five and six years of age, the uterine parietes are nearly of an equal thickness, and remain so until the period of puberty, when the body becomes somewhat thicker than the cervix."

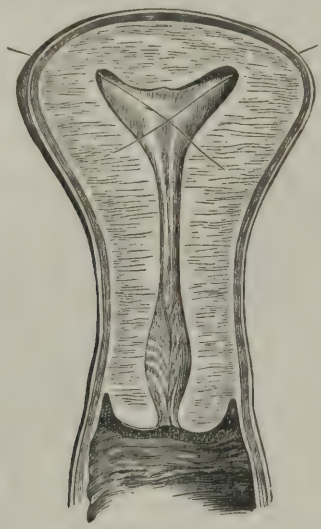
80. The adult healthy uterus may vary a little in size, but the following measurements, given by Dr. Burns, are sufficiently accurate:—"The length of the uterus, from the margin of the lip to the fundus, is two inches and three quarters; breadth between the insertion of the fallopian tubes, from two inches and three-eighths to two and five-eighths; the middle of the fundus rises a quarter of an inch above a line drawn from the insertion of one tube to that of the other; the commencement of the body is an inch and a quarter broad, its thickness is an inch; the whole of the wall is half an inch, but at the fundus it is seven-eighths, or one eighth of an inch less. The thickness of that part of the cervix which projects into the vagina, including the coat of that canal which is reflected over it, is an inch and one eighth; its breadth an inch and a quarter. The breadth of the termination or lips of the os uteri, an inch and one eighth; thickness, including both lips, three quarters of an inch. The length of the transverse chink, or os uteri, from three eighths to half an inch; each lip is three-eighths of an inch thick, though the posterior is said to be thinnest." "From the margin of the lip to the top of the

cervix is an inch, but sometimes only three quarters, or even less. From the top of the triangular cavity of the fundus to the end of the narrow cylindrical cavity of the body is an inch and one-eighth; the extreme breadth of the top of the cavity stretching from the entrance of one tube to that of the other is nearly an inch and a half."

According to the calculations of Levret, its superfices may be reckoned at sixteen inches, and its cavity at eleven twelfths, or about three quarters of a cubic inch.

The weight of a virgin uterus, according to Meckel, is from seven to eight drachms; but after child-bearing, it amounts to an ounce and a half.

Fig. 29.



81. The *Os Uteri* or *Os Tincæ*, is situated at the lower part of the cervix, varying in form in different individuals; in many it is a transverse chink or slit, in others a circular opening, and in some triangular, resembling a leech-bite, especially in those who have borne many children. It is generally about the size of a goose-quill, or rather smaller.

The *Canal of the Cervix* is from half to three quarters of an inch long, leading from the os uteri; it first widens, and then contracts again where it enters the cavity of the uterus, marking the *os uteri internum*, as it has been called. Between the os uteri externum and internum the mucous membrane is curiously disposed in rugæ, branching out from a central line; this has been called the *arbor vitæ*. The internal surface of this canal is thickly studded with mucous follicles, called *glandulæ Nabothi*, and which, after impregnation, secrete a thick mucus which blocks up the canal.

The cavity of the uterus is of a triangular shape, the base being upwards; its dimensions have already been given.

82. Much difference of opinion has existed, and many discussions have taken place, as to the structures which compose the uterus; though

of late years the opinions of authors are more harmonious. It possesses three distinct tunics: I. We have already seen (§ 77) that it is covered anteriorly and posteriorly by *peritoneum*, which is reflected laterally to the sides of the pelvis, near the sacro-iliac synchondrosis, forming the *broad ligaments of the uterus* or the *alæ vespertilionis*, on each side, containing the fallopian tubes, ovaries, and round ligaments. From their attachment to the pelvis they may perhaps serve as supports to the uterus, at least before conception. This serous covering is identical with the lining of the abdomen.

83. II. The *Middle Coat of the Uterus* is by some asserted, and by others denied, to be muscular; but this really appears to me little more than a dispute about the name, for those who deny its muscularity, admit that it performs the functions of a muscle. It differs in colour from ordinary muscle, being yellowish, with a faint tinge of red, like the middle coat of arteries, and it is much more dense than muscular tissue. It consists of fibrous structure, though it is not easy to trace the course of the fibres in the unimpregnated womb; however, when the uterus is enlarged from impregnation or other causes, it can readily be done, and they may be divided into several sets. The superficial set are very irregular, interlacing with each other in every direction, though with a general tendency from the fundus towards the cervix; but some regularity is observable in the deeper sets; for instance, there is a circular arrangement around the orifice of each fallopian tube, and at the os uteri; a layer diverging from the middle line anteriorly and posteriorly, and perpendicular bands descending to the os uteri. Among these more regular layers there are irregular fibres interspersed.

From the middle coat, fibres are sent off to the fallopian tubes and round ligaments. The reader will do well to consult Meckel's Anatomy on this subject, and Sir C. Bell's valuable paper in the fourth volume of Med. Chir. Transactions.

84. III. The *Mucous Coat.*—A considerable number of distinguished foreign writers, among whom we find Morgagni, Assoguidi, Chaussier, and Moreau, have denied the existence of any lining membrane in the uterus, from the difficulty of separating and demonstrating it. I cannot understand this; for it has always appeared to me very evident, even in a state of health and quiescence, but still more when the seat of disease or pregnancy.

Others, as Dewees, Boivin, and Dugès, &c. do not question the presence of a lining membrane, but contend that it is not mucous, and apparently for the sole reason that one of its functions (menstruation) is not a function of mucous membranes. This objection, however, is refuted by the fact, that other mucous membranes do occasionally secrete a fluid apparently identical with the menses (vicarious menstruation); and we may add, that the uterine membrane presents the anatomical characteristics of mucous membrane; that it secretes mucus, undistinguishable from that of the vagina; and lymph (decidua), analogous to that thrown off by mucous membranes in certain diseases (croup). Its pathology also is that of mucous membrane.

For these reasons I have no doubt that the uterus is lined by mucous membrane, continued from the mucous membrane of the vagina after it covers the cervix uteri. In the canal of the cervix, as we have seen,

it is thrown into numerous folds; but in the cavity it is smooth, sending off a process into each fallopian tube. Its colour is a pale pink, except during menstruation, when it becomes of a deep red, in which, however, the cervix does not participate. Under ordinary circumstances, but little mucus is secreted; but it becomes morbidly profuse occasionally, and after conception, the cervix is closed by mucus of a thicker consistence.

85. The *Arteries* of the uterus are four in number, furnished by the aorta, the hypogastric, and emulgent arteries. The two superior — the spermatic — arise from the aorta or emulgent arteries, and descend along the sides of the womb in a serpentine course; they are distributed to the upper part of the uterus, to the fallopian tubes and ovaries. The two inferior — the uterine arteries — given off by the hypogastric arteries, run along the sides of the uterus, to within a short distance of the lips, then divide, and supply the cervix and upper part of the vagina. The spermatic and uterine arteries anastomose freely with each other.

86. The *Veins* are more numerous than the arteries, are capable of greater distension, and lie superior to their corresponding arterial branches. They possess no valves, and, like the arteries, are of small size so long as the genital system is quiescent, but increase very greatly during pregnancy, when they form what have been called the uterine sinuses.

87. Some uncertainty has existed as to the *Nerves* of the uterus; but the researches of Dr. R. Lee, added to those of his predecessors, have rendered our information more complete. They arise from the aortic plexus, and from the hypogastric nerves and plexus, being a mixture of spinal and sympathetic nerves. I shall take the liberty of quoting Dr. Lee's account of a dissection of these nerves in the unimpregnated uterus: "The aortic plexus, the hypogastric nerves and plexuses, were all much smaller than in any of the gravid uteri I had previously seen. From the fore and middle part of the left hypogastric plexus, a small branch passed down on the inside of the ureter, to the trunk of the uterine artery and veins, which was surrounded with a plexus of nerves, as in the gravid uteri before examined. From this, branches passed upwards to the fundus uteri, and a communication between these and the spermatic nerves was quite evident. From the left hypogastric plexus numerous branches passed also directly into the uterus, without entering the ganglia at the cervix, which ramified on the peritoneum behind, and on the muscular coat. Branches from the posterior part of the hypogastric plexus, communicated with some branches of the sacral nerves behind the ganglion. The trunk of the left hypogastric nerve was easily traced through the plexus to the upper part of the ganglion, which was remarkably large and distinct, and consisted of white and grey matter. Into the posterior part of the ganglion the third sacral nerve sent numerous branches. From the anterior margin of the ganglion, a broad band of white and grey nerves passed round the outer surface of the ureter, and, after uniting with a similar band on the inside, sent branches to the plexus surrounding the uterine artery and vein, and also branches to the anterior surface of the uterus. Large flat nerves were seen passing off from the anterior border of the ganglion, to the bladder and vagina, and from its inferior and posterior borders to the vagina and rectum. A great number of nerves likewise passed off from the inner surface of the ganglion, into

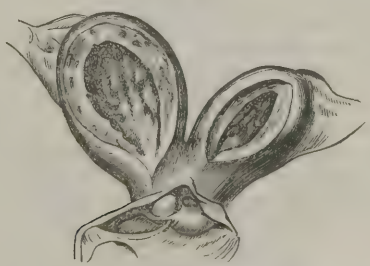
the cervix uteri. The nerves sent off from the ganglion were both larger and more numerous than those which entered it. A great web of nerves was seen under the peritoneum, both on the anterior and posterior surface of the uterus, intimately connected with the nerves sent off by the ganglion and the hypogastric plexus."*

88. The *Lymphatics* are very numerous, though very small, in the unimpregnated uterus. The most numerous set of these vessels, runs from the upper part of the body and cervix of the womb along with the spermatic vessels, and with those from the ovary, in front of the psoæ muscles, and terminates in the glands, in front of the aorta, vena cava and lumbar vertebræ. Another set accompanies the uterine artery, and issues with the round ligament through the inguinal ring. A third set joins the lymphatics of the vagina, and enters the hypogastric plexus.

89. The lower portion of the body of the uterus is within the reach of a vaginal examination, so that we can estimate its size, temperature, integrity, mobility, sensibility, &c.; and by the use of the speculum we are able to ascertain its colour, the state of its surface, and, if necessary, to apply local remedies. Further information as to its condition may be obtained in many cases by abdominal manipulation; and, in the case of enlargements, by the application of the stethoscope. An examination "*per rectum*" is of value in certain diseases of the uterus, and especially of the ovaries.

90. *Abnormal deviations.*—1. The uterus may be altogether wanting; several such cases are on record. 2. The canal of the cervix may be extremely narrow throughout, or it may be the seat of stricture. 3. It may be closed, either by the union of its sides, or by the mucous membrane being continued over the os uteri. 4. The uterus may be malformed; and it is remarkable that these malformations, which are owing to an arrest of development, appear to reproduce the analogous organs

Fig. 30.



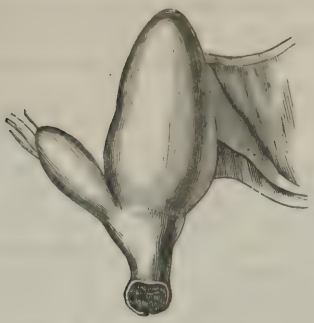
of lower classes of animals; for instance, the *double uterus* (fig. 30) resembles in some degree the tubular oviduct of birds; it opens by two ora uteri into the vagina.

The *uterus bicollis* (fig. 31) exhibits two bodies with but one os uteri, and resembles the organ of some rodentia and carnivora.

Again, the junction of the cornua may take place higher up, constituting the *uterus bicorporeus;* here the lowest part of the body of the uterus is single, and the upper double.

* The Anatomy of the Nerves of the Uterus, by Robert Lee, M. D. &c. p. 7.

Fig. 31.



In the *uterus biangularis* the body of the womb is tolerably well formed, and terminating in cornua, as in the monkey tribes. Several intermediate stages of this progress, from the lowest to the highest form of a single

Fig. 32.

uterus, have been noticed; but I shall only add two more illustrations; one when the uterus is double, opening by two orifices into two separate vaginæ (fig. 32), and another when the uterus was separated into two cavities by a septum, but having only a common opening inferiorly (fig. 33).

Fig. 33.

These congenital malformations are by no means very rare; Dr. Cassan collected forty-one examples, and many others have since been recorded

The effect of the first three abnormal deviations will be either the absence of menstruation, and consequent sterility, or inefficient or painful menstruation. The deviations from arrest of development may exert no

injurious influence upon menstruation or conception, but they have been adduced to explain the phenomenon of superfœtation, as it is pretty certain that a double conception may take place; and when it is single, the vacant cavity is lined by decidua. In addition, the uterus is the seat of many forms of disease.*

91. The Fallopian Tubes are two cylindrical canals, about four inches long, proceeding from the upper angles of the uterus. They are contained in the superior and lateral folds of the broad ligaments. Internally, they open obliquely into the uterus, at which point the canal is narrow; it afterwards expands, and then again contracts towards its external termination, where it is open to the abdomen. Externally, the tubes are of equal thickness for about three inches and a half, when they expand and terminate in a fringed process, called the *fimbriæ*, or *morsus diaboli*, which is applied to the ovary after impregnation. The tubes are covered externally by peritoneum, beneath which is their proper tissue, of a spongy erectile nature, with some circular and longitudinal fibres, derived from the middle coat of the uterus. Internally, they are lined by mucous membrane, disposed in longitudinal folds, the villi of which are highly developed after impregnation. The tubes share in the vessels and nerves by which the ovaries are supplied.

Their *function* is the transmission of spermatozoa to the ovary in the first instance, and afterwards of the impregnated ovum to the uterus; in fact, they are the excretory ducts of the ovary.

92. *Abnormal deviations.* — The tubes, one or both, may be impervious, from disease, or as a congenital malformation. The closure of both of course entails sterility. They are also subject to inflammation and its consequences, and to malignant diseases.

93. The Ovaries are the essential organs of generation in the female; they are the "analogues" of the testes in the male, and, up to the time of Steno, were called "*testes mulieris.*" They are situated on each side of the uterus, to which they are attached by the posterior duplicature of the broad ligaments, hence called the *ligamentum ovarii.*

They are small, oval, flattened bodies, broader at the end distant from the womb; about an inch and a quarter or an inch and a half long, from half to five-eighths of an inch at their greatest breadth, and a quarter of an inch thick. They hang loosely in the pelvis, beneath and somewhat behind the fimbriated extremity of the fallopian tubes. Smooth externally in virgins, they become wrinkled in old age.

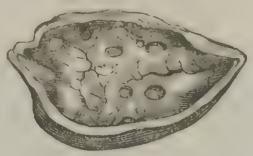
Their external covering is the serous membrane, constituting the broad ligament, in which they are completely enveloped, except at the part where the vessels enter.

Underneath the peritoneum they possess a proper fibrous coat of dense structure, called the *Tunica Albuginea.*

* A singular instance of malformation of the uterus is recorded by M. Lecluyse. The subject of it "was a small female, who had previously been twice confined with an arm presentation. The occurrence of the same accident for the third time caused the accoucheur to make a minute examination, in order, if possible, to find an explanation of so unusual a circumstance. The result of the investigation was, the womb, instead of being of the natural pyriform shape, had its greatest diameter in a transverse direction; so that the long axis of the elliptic form which the fœtus occupies in utero was horizontal. This anomaly was thought by M. Lecluyse to account for the three consecutive arm presentations." — *Ranking's Abstract,* p. 240, American edition, from *Journal de Chirurgie,* Mars, 1845. — Editor.

94. When laid open, we find their internal structure to consist of cellular tissue, permeated by numerous blood-vessels derived from the sper-

Fig. 34.



matic arteries, running tortuously across the ovaries in nearly parallel lines, and by nerves. Embedded in the cellular parenchyma of the organ, in the adult, a number (from 10 to 20) of small vesicles may be observed, which, though noted by Fallopius and Vesalius, were more particularly described by De Graaf, and called, after him, *Graafian Vesicles*.

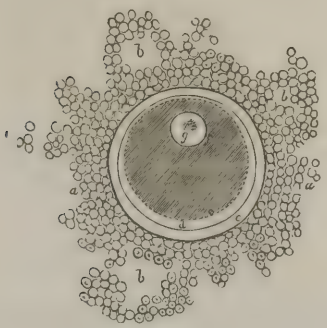
They vary somewhat in number; and in size, from that of the head of a small pin to that of a small pea.

95. There is some difference of opinion as to the age at which these vesicles are developed; some say, about the period of puberty; others, among whom is Dr. Rigby, state that they make their appearance about the seventh year; but, according to M. Negrier, in his "*Recherches sur les Ovaires*," lately published, they are to be found much earlier. He states that at birth the texture of the ovarian parenchyma is homogeneous, but that, in the course of a year, an uncertain number of miliary granulations may be observed; after a short time, these granulations are surrounded by an opaque zone, and a small vesicular globule, whose walls are formed by this zone, is annexed to the granule. This globule contains a vesicle (the Graafian) formed by two membranes, concentric and in contact. At the age of ten or twelve, certain of the vesicles increase in size, and cease to be transparent, because of the interposition between the two membranes of a grey pulpy matter. At the same time, the vesicles go on increasing more rapidly than the cavity in the ovarian tissue in which they are lodged, which gives to them a compressed and slightly corrugated appearance. The grey pulp of the vesicle is gradually changed to a yellow colour, marking the epoch of puberty. The vesicles are connected to the part in which they are imbedded by cellular filaments, which become weaker in proportion to the age of the child. During early life the vesicles occupy the deeper parts of the ovary, but gradually approach towards the circumference; and, at the time when the pulp becomes yellow, some of them are in contact with the envelope of the ovary. I have condensed this account from M. Negrier, but am not able to decide upon its correctness.

96. So much for the development of the Graafian vesicles: upon their intimate structure, very great light has been thrown of late years by the labours of Baer, Rathke, Purkinje, Valentin, Wagner, &c., in Germany; of Prevost, Dumas, Coste, &c., in France; and of Allan Thompson, Wharton Jones, and Martin Barry, &c., in England. From their writings the following description has been gathered, which I believe to be correct, with the exception of a few minor points not yet settled.

The Graafian vesicle consists of an external and an internal membrane: the former (*tunic of the ovisac, Barry*) is extremely vascular; the latter

Fig. 35.



Ovum of Rabbit.

aa. Discus proligerus.
bb. Pale oil globules.
c. Zona pellucida.
d. Vitelline membrane.
e. Vitellus.
f. Germinal vesicle.
g. Germinal spot.

(*ovisac*, *Barry*) is smooth and velvety, deriving its vessels from the former. The cavity enclosed by these membranes is far from being filled by the ovum; it contains, besides, a whitish or yellowish albuminous mass, which consists chiefly of granules, from the $\frac{1}{200}$ to the $\frac{1}{300}$ part of a line in diameter, connected together by a tenacious fluid, and forming the *tunica granulosa* of Bischoff, Wagner, and Barry. Its density is unequal; towards some part of the periphery of the vesicle these granules are accumulated in a disk-like form, making a slight prominence, in which is a depression.

The disk and prominence are termed by Baer the *discus proligerus* and *cumulus*. Dr. Barry has also observed certain granular cords, resembling the chalazæ in the egg in appearance and function, and which he has called the *retinacula*. In the depression in the cumulus is lodged the ovum (*ovulum*, *Baer*), the discovery of which by Professor v. Baer explained satisfactorily the small size of the ova observed in the fallopian tube by De Graaf, Cruikshank, and Haighton, compared with the Graafian vesicle in the ovary. The ovum is surrounded by a thick white ring, which has been called *zona pellucida*, but which Valentin and Wagner conceive to be a membrane; internal to which we find a granular layer, the *vitellus*, the larger granules of which are superficial and compact, whilst internally it is a clear albuminous fluid, almost devoid of granules.

Embedded in this vitellus, but nearer to its circumference than centre, is the *germinal vesicle* or *vesicle of Purkinje*, a very important part of the ovum. It was first discovered in eggs by Purkinje, but in mammalia by Wharton Jones, Coste, Valentin, and Bernhardt. It appears like a clear ring of very small size, measuring in man and mammalia at most $\frac{1}{60}$ part of a line in diameter. Upon the surface of the germinal vesicle a dark spot was discovered by Wagner, and called by him *macula germinativa*. "It is almost always seen as a simple rounded body, from $\frac{1}{200}$ to $\frac{1}{300}$ part of a line in diameter; it is very rarely observed double, or as an

Fig. 36.

Ovum of Man, from Bernhardt.

1. Germinal vesicle.
2. Vitellus.
3. Chorion. (Zona pellucida?)
4. Tunica granulosa.

aggregate of granules, which, however, is sometimes the case in immature ova."

It may serve to render this minute description more intelligible to the student, if I give the summary of Valentin and Barry of the contents of a Graafian vesicle:

Valentin.	Barry.
1. An external membrane (yolk-bag).	1. Tunic of the ovisac.
2. Fluid contents (yolk).	2. Ovisac.
3. Layer of granules which form the disk (blastoderma).	3. Membrana granulosa, in which are found—
4. Ovum or ovulum, in which is to be distinguished—	4. Tunica granulosa and retinacula (disk and cumulus of Baer).
5. An outer membrane.	5. Zona pellucida.
6. A granular layer, internal to it.	6. Membrana vitelli.
7. A transparent half-fluid content.	7. The yolk.
8. The germinal vesicle.	8. Germ vesicle, with Wagner's germinal spot.

Dr. Barry states that the tunic of the ovisac is not always present; but that, when it is, it is furnished by the ovary. The order of time in which the parts are formed is thus given by him:—1, the germinal vesicle with its contents; 2, an envelope consisting of peculiar granules and oil-like globules; 3, the ovisac; 4, the yolk; 5, the membrana vitelli; 6, the zona pellucida; and, 7, the tunic of the ovisac, tunica granulosa, retinacula, and membrana granulosa.

97. *Abnormal deviations.*—One or both ovaries may be absent, or atrophied. There may be few or no Graafian vesicles, or they may be morbidly changed. The ovaries may also be the seat of inflammation, dropsy, malignant diseases, &c.

The absence or disorganization of both ovaries, or of all the Graafian vesicles, entails sterility; but conception is not impossible, so long as a portion remains healthy.

Having thus minutely investigated the anatomy of the sexual system in the female, we may now proceed to consider its functions.

PART II.

PHYSIOLOGY OF THE ORGANS OF GENERATION.

CHAPTER I.

PHYSIOLOGY OF THE UTERUS AND OVARIES.—1. MENSTRUATION.

98. The generative organs of the female are in a state of activity only during the prime of life, embracing a period of about thirty years; and during this time, the most remarkable characteristic of their functions is their periodicity.

It is impossible to separate the functions of the uterus from those of the ovary, because in each we may discern their combined influence. Those offices which are peculiarly uterine, may thus be enumerated:—1, the secretion of mucus; 2, secretion of the menses; 3, secretion of decidua; 4, reception and nutrition of the fœtus; and, 5, the expulsion of the fœtus. From the ovary, on the other hand, is derived, 1, the effective stimulus to menstruation, and, 2, the fecundated germ; so that we see that the effective co-operation of both the organs is necessary for the fulfilment of either of the three great functions of the uterine system, viz., Menstruation, Conception, and Parturition. We shall consider these functions in order.

99. Menstruation.—In healthy women, at the period of puberty, a certain amount of sanguineous fluid is eliminated by the uterus, and escapes from the vagina, every month; this is termed the *catamenia*, or *menses*, and the function itself, *menstruation*.

That it is excreted by the uterus has been ascertained in cases of prolapse and inversion of the organ; and that it is really a secretion by its lining membrane, and not blood mechanically filtered through it, is, I believe, now generally admitted.*

A female in whom this discharge recurs *at the usual periods*, *in the usual quantity*, and of the *usual quality*, is said to be "*regular*;" and various conventional phrases are in use to avoid a more direct reference, as "being regular," "unwell," &c.

100. The occurrence of menstruation defines the period of puberty, at which the girl becomes a woman and capable of conception; as its cessation terminates the prolific period of female life. In Great Britain this

* It has been shown by the researches of modern physiologists, that the catamenial fluid is ordinary blood mixed with the mucus of the vagina and epithelial cells. Menstruation is, therefore, a periodical hæmorrhage from the uterus. The doctrine of the secretion of the menses is altogether untenable.—Editor.

generally happens between the ages of thirteen and sixteen, although we meet with cases of earlier and later puberty, dependent, probably, upon peculiarity of constitution, habits of life, pursuits, &c. A case is recorded by Dr. Wall, in the second volume of the Med. Chir. Trans., of a child who menstruated at nine months old, and continued to do so regularly afterwards. There is another instance in the American Journ. of Med. Science, for Nov. 1832, by Dr. Le Beau of New Orleans, of a child born with the marks of puberty, in whom the catamenia appeared at three years of age, and recurred regularly. Additional examples may be found in the writings of Lobstein, Meyer, Ploucquet, &c. &c. Mr. Roberton, of Manchester, in a valuable paper "On the Natural History of Menstruation," in the thirty-eighth volume of the Edinburgh Med. and Surg. Journal, has stated the age at which it commenced in 450 cases.

10	menstruated	for the first time at	11	years of age.
19	"	"	12	"
53	"	"	13	"
85	"	"	14	"
97	"	"	15	"
76	"	"	16	"
57	"	"	17	"
26	"	"	18	"
23	"	"	19	"
4	"	"	20	"

Mr. Whitehead, in his work on abortion, gives the following table, showing the age at which puberty was established in 4000 individuals in Manchester:—

At the age of	10	years	9	first menstruated.
"	11	"	26	"
"	12	"	136	"
"	13	"	332	"
"	14	"	638	"
"	15	"	761	"
"	16	"	967	"
"	17	"	499	"
"	18	"	393	"
"	19	"	148	"
"	20	"	71	"
"	21	"	9	"
"	22	"	6	"
"	23	"	2	"
"	24	"	1	"
"	25	"	1	"
"	26	"	1	"*

101. In these countries the discharge continues until the age of forty-

* *M. Brierre de Boismont*, in his work, "*De la Menstruation considerée dans ses Rapports Physiologiques et Pathologiques*," among a mass of interesting facts, gives the

five or fifty; in some cases it ceases earlier, in others it continues longer; generally according to the age at which it commenced. From Mr. Roberton's essay I extract the periods at which it ceased in 77 individuals:

following curious table of ages at which menstruation commences. It is the most extensive table yet published, and includes the results of 2352 cases.

Age.	Paris, 1200 cases by Meniers.	Paris, 85 cases by Marc D'Espine.	Lyons, 432 cases by Petrequin.	Marseilles. 68 cases by Marc D'Espine.	Manchester, 450 cases by Roberton.	Gottingen, 137 cases by Osiander.
5	1	0	0		0	0
7	1	0	0	0	0	0
8	2	0	0	0	0	0
9	10	1	0	0	0	0
10	29	0	5	0	0	0
11	93	3	14	6	10	3
12	105	14	26	10	19	1
13	132	6	47	13	53	0
14	194	18	50	9	85	20
15	190	14	70	16	97	32
16	141	7	79	8	76	24
17	127	6	58	4	57	11
18	90	5	38	2	26	18
19	35	8	21	0	23	10
20	30	3	9	0	4	8
21	8	0	5	0	0	1
22	8	0	1	0	0	0
23	4	0	0	0	0	1
24	0	0	3	0	0	0

This table demonstrates that by far the greater number of women begin to menstruate during their 14th or 15th year, and that the proportion diminishes both above and under that age.*

"It is a common opinion, generally admitted all over Europe, that puberty occurs earlier in hot climates than in those lying within the temperate zone. Muller says that it is stated that, in the hot regions of Africa, the changes of puberty take place in the female sex as early as the eighth year, and during the ninth year in Persia. Young Jewesses are also said to menstruate earlier than other females in our own country. This opinion Mr. Roberton, of Manchester, has essayed to controvert, in the belief that it was no other than a vulgar error. To enable him to obtain the necessary information with respect to the negress, Mr. Roberton applied to the superintendents of the Moravian Missions in Antigua and Jamaica, by whom registers of births had been kept, the registry being important in fixing the date of the first appearance of the catamenia. From these gentlemen he received the information he desired, and which confirmed him in the belief that menstruation does not commence earlier in the negress than in the white. Out of 21 cases, menstruation appeared in one aged 16, in three at 15, in three at 14, in three at 13, and in two at 12; while it had not appeared in one aged 14, in two aged 13, in one aged 12, in one aged 11, one aged 10, one aged 9, and two aged 8. It is further added, that many cases of negresses, from 8 to 11 years of age, who have not yet had any menstrual secretion, might be added."†

A very interesting case by Dr. Carus, of Dresden, is mentioned in the recent medical journals, of a child born in the mountains of Saxony, in whom menstruation began at two years of age.

"She was scarcely a year old, when she began to grow rapidly. At the end of her second twelvemonth, the catamenia appeared, and have continued ever since to flow regularly once a month. The Academy of Medicine of Dresden sent for both her and her mother, and, in order to examine more particularly into the case, kept them under their observation during several weeks. The infant was 37 inches 3 lines long. The

* Edinb. Med. and Surg. Journ., Jan. 1843.

† Braithwaite's Retrospect of Med. and Surgery, vol. vi., page 251—from Provincial Med. and Surg. Journal, Aug. 1842.

In 1	at the age of	35	In 26	at the age of	50
4	"	40	2	"	51
1	"	42	7	"	52
1	"	43	2	"	53
3	"	44	2	"	54
4	"	45	1	"	57
3	"	47	2	"	60
10	"	48	1	"	70
7	"	49			

The period of its cessation is called by women the "*time, or turn of life*," and is preceded by irregularity and occasional interruption. It is looked upon as a critical period, from the supposed liability to serious attacks, and the greater mortality; but the researches of MM. Benoiston de Chateauneuf, Bellefroid, &c., have shown that the mortality at this period of female life is not greater than amongst males at the same age.

102. By most writers on the subject, we find it stated that menstruation commences and terminates much earlier than the period I have named in hot climates, and much later in cold ones. Women are stated to be mothers at ten or twelve years old in the East, and to cease bearing at twenty-five or thirty; and that in Lapland, and other northern climes, they do not begin to menstruate until about twenty or twenty-four, and continue until sixty years of age. That such cases do occur there seems no reason to doubt; but it appears extremely probable, that such is not the ordinary course. Mr. Roberton has collected a great mass of evidence to prove that these instances are exceptions; and taking into account the limited opportunities for observation of travellers, upon whose statements the former opinion is founded, and other causes of error, I am inclined to agree with him, that there is probably no such great difference in the age of uterine activity in different countries, as has been stated.

103. As the name (*menses*, *catamenia*) implies, the discharge recurs every month; that is, deducting four or six days for the time of its flow, every twenty-seven or twenty-eight days. Mr. Roberton found that, out of 100 women, 61 menstruated every month, 28 every three weeks, 10 at uncertain intervals, and one, a healthy woman æt. twenty-three, every fortnight. The shortening of the interval of twenty-six or twenty-eight days is a deviation from functional integrity, owing, most likely, to habits of life, impaired constitution, &c. Dr. Gall made some very curious observations, from a journal which he kept of the periods of menstruation in different women: "It resulted" (I quote from Elliotson's Physiology, not having the original at hand) "that women are divided into two great classes, each having a different period. The women of the same class all menstruate within eight days; after this time an interval of ten or twelve days follows, during which very few women menstruate. At the end of

mammæ were firm, like those of a strong girl of 16. Her body was stoutly made, and the genital organs were covered with dark brown hair. Her physiognomy and tone of voice were childish, which contrasted singularly with the strength of her body. Her intellectual functions were equal to those of a child three years old, and her head was covered with beautiful dark brown hair."*—EDITOR.

* American Journal of the Medical Sciences, April, 1843, page 436—from Allgemeine Zeit. für Chirurgie.

the ten or twelve days, begins the period of the second great class, all the individuals of which also menstruate within eight days." Admitting exceptions to the rule, Dr. Gall says that it applies generally to all parts of Europe.

104. The duration of each menstrual period varies from three to six days, or even longer. The quantity which escapes each time is from four to eight ounces, varying according to the temperament or constitution of the individual. It is not discharged at once, but slowly and gradually. As to the character of the secretion, it greatly resembles venous blood, being of a dark red colour, thin, and either without odour, or with a very faint one. It differs from blood in containing no fibrine; it is not coagulable, nor easily decomposed. It is found to redden litmus paper, and to contain free phosphoric and lactic acids, with some phosphate of lime.

105. The *symptoms* which precede and accompany the first menstruation are very slight in some cases, well marked in others. There is generally a degree of languor and lassitude, fatigue after exertion, inequality of spirits, dark shade under the eyes, headach, sometimes pain in the thyroid gland, pain in the back, weight and aching in the pelvis and down the thighs, &c.: occasionally there is a smart attack of fever.

If the discharge take place, most of these symptoms disappear, and the female merely complains of weakness, and exhibits pallor of countenance.

But the symptoms may pass off once or twice without the appearance of the menses, or *with a white discharge only.* This may generally be remedied by an improvement in diet, or tonics at the approach of the next menstrual period.

Sometimes the colour of the discharge is light at first, growing deeper each period. During its flow, the skin exhales a peculiar odour, the appetite is diminished, and often capricious, and occasionally sympathetic pains are felt in the breasts. There is a case, related in the British and Foreign Med. Review for October, 1840, of a woman whose breasts secreted milk after each menstrual period. I have lately had one under my care.

The amount of suffering differs, as I have said, in different women; and I may add, that the first menstruation is not necessarily a type of the subsequent periods. The more perfectly the function is performed, the less is the distress.

106. The effects of the development of this function upon the body and mind of a young girl, are very striking. The figure enlarges, becomes rounder and more fully formed, the pelvis expands, the mammæ enlarge, and the general bearing becomes graceful and dignified. The mental change is as remarkable: the pursuits of girlhood are exchanged for more womanly interests; and a more exquisite perception of her position and relations, results in higher enjoyment, veiled by a more delicate modesty. These changes are rapid, and, occurring at this peculiar period, doubtless fit the individual for the more perfect fulfilment of the duties about to devolve upon her.

107. The *causes* of menstruation have been divided into the *efficient* and *final:* as to the *first* of these, — the *efficient cause,* — much time has been wasted in speculations, which, after all, are nothing but guesses: thus, it has been attributed to general and local plethora, to lunar influence, &c. We do not know *why* the catamenia occur at monthly periods; it

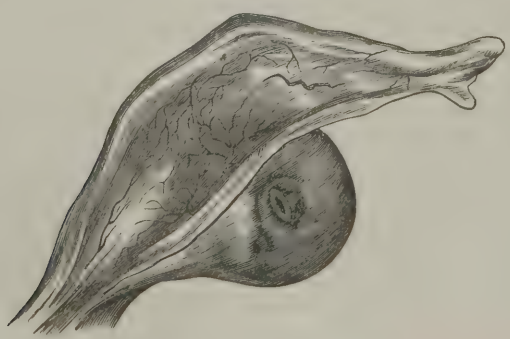
is one instance of the periodicity which characterises the functions of the female sexual system, and which we shall observe again and again.

108. A much more important question is the nature and extent of the influence exerted by the ovaries upon menstruation. By most writers the uterus is regarded as the sole organ involved; but from time to time ovarian influence has been admitted. A reference of this kind is made by Dr. Friend, in his "Emmenologia;" and Dr. Power goes further, and attributes menstruation entirely to the action of the ovaries; Dr. Vaughan also regarded the menses as a secretion dependent upon the ovaries; and other authorities might be adduced. Indeed, there are certain facts which cannot but lead to an admission of a certain influence exerted over menstruation by these organs: for instance, it is well known that they participate in the congestion which is observed in the uterus at the monthly periods; again, when the ovaries have both been atrophied or diseased, as noticed by Morgagni and Frank; or when one was congenitally absent and the other disorganised, as in a case related to me by my friend Dr. Montgomery; the secretion of the menses has been prevented altogether, or it has ceased prematurely. Moreover, when the uterus is absent, but the ovaries present, the menstrual *molimen* and other sexual peculiarities are observed. Lastly, when the ovaries have been removed, as in the case mentioned by Mr. Pott, menstruation ceased entirely.

From these considerations we may conclude, that although the uterus be the seat, and its lining membrane the agent in the process, yet that the ovaries furnish the impulse or stimulus upon which the function depends.

109. An inquiry into the changes which take place in the organs during menstruation, will confirm the conclusions at which we have arrived, and throw some light upon the nature of the stimulus. For almost all the accurate information we possess, we are indebted to the recent researches of Drs. Girdwood, Lee, Ritchie, in this country, and Pouchet, Negrier, Gendrin, Bischoff, Raciborski, Chereau, &c., on the continent; although the main fact established by their labours was cursorily noticed by Mr. Cruikshank so long ago as 1797: "I have also," he says, "in my pos-

Fig. 37.



session the uterus and ovaria of a young woman, who died with the menses upon her. The external membranes of the ovary were burst at one place, from whence I suspect an ovum escaped, descended through the tube to the uterus, and was washed off by the menstrual blood." Several

similar observations have been published by Dr. Lee in the Cyclop. of Pract. Medicine, and since in the Med. Chir. Transactions; Mr. Girdwood and M. Gendrin have each added five cases, and M. Negrier five more, of the same kind. All the observations agree, that, in females dying during or soon after menstruation, a small irregular rupture or cicatrix was found in the coats of the ovarium (fig. 37), and that this communicated with the remains of one of the Graafian vesicles; from which Dr. Lee concludes that it is "extremely probable that all the phenomena of menstruation depend upon, or are connected with, some peculiar changes in the Graafian vesicles, in consequence of which, an opening is formed in the peritoneal and proper coats. Whether an entire vesicle, or only the fluid it contains, escapes through this opening at the period of menstruation, further observations may hereafter determine."*

* The "*efficient*" cause of menstruation has long been a subject of speculation with physiologists. The changes that are now ascertained to take place in the ovaries, which render it probable that one or more Graafian vesicles are ruptured at each menstrual period, shed new light upon the subject, and may lead to clearer views in relation to it. The following facts are derived from Lecture IV., by Dr. Robert Lee, On the Physiology of the Unimpregnated Uterus and its Appendages, contained in the London Medical Gazette of November 5th, 1842:—

"On the 11th of March, 1831, I examined the body of a young woman who died, during menstruation, from inflammation of the median basilic vein. The left ovarium was larger than the right, and at one point a small circular opening, with a thin irregular edge, was observed in the peritoneal coat, which led to a cavity of no great depth in the ovarium. Around the opening, to an extent of three or four lines, the surface of the ovarium was of a bright red colour, and considerably elevated above the surrounding part of the peritoneal coat. On cutting into the ovarium, its substance around the opening and depression was vascular, and several Graafian vesicles, of different sizes, were observed. The right ovarium was in the ordinary state. Both fallopian tubes were intensely red and swollen, and their cavities were filled with what appeared to be menstrual fluid. The lining membrane of the uterus was coated with the same fluid, and the parietes were soft and vascular. The size of the uterus was not increased. I pointed out this opening in the peritoneum of the ovary, which I accidentally observed, to Dr. Girdwood and Dr. Prout, and suspected that there was some relation between this and the state of the uterus. At this time I had not seen the human ovum in the Graafian vesicle before impregnation, and was not then aware that cicatrices are never present on the surface of the ovaria before menstruation has commenced.

"In the autumn of 1831, Dr. John Prout saw a woman, under 20 years of age, who died suddenly from acute inflammation of the lungs while menstruating. He examined the body, and brought the uterine organs to me, having taken the greatest care that they should not suffer from any force during their removal from the pelvis. A red, soft, elevated portion of the right ovarium was also here observed, and at one part the peritoneal coat, to a small extent, had been removed. The edge of the opening was extremely thin and irregular; and in the substance of the ovarium, under the opening, was an enlarged Graafian vesicle, filled with transparent fluid. Numerous small blood-vessels were seen running along the peritoneal coat of the ovary to the opening. When the substance of the ovarium was laid open, several vesicles, of various sizes, and at different depths, were found embedded in it. The left ovarium presented a natural appearance. The free extremities of the fallopian tubes were gorged with blood. Their cavities were filled with a red-coloured fluid. The uterus was not enlarged, but the parietes were unusually full of blood, and the lining membrane of the fundus was coated with menstrual fluid. A small coagulum of blood likewise adhered to the upper part of the uterus. I now felt convinced that there must be some connexion between this state of the ovaria and menstruation, and mentioned the facts to Sir Astley Cooper.

"On the 2d of July, 1832, Sir Astley sent me the ovarium of a woman who died from cholera while menstruating. The ovarium was much larger than natural, and at one point there was a small irregular aperture in its peritoneal coat, through which a portion of a slender coagulum of blood was suspended. On cutting into the substance of the ovarium, it was found to be occupied with three small cysts or cavities, one of which was filled with a clear ropy fluid, another with semi-fluid blood, and the third,

The changes which take place in the vesicle are thus summed up by M. Negrier: an afflux of transparent fluid occurs in the vesicle, distending and ultimately causing its rupture at the least resisting part, which corresponds to the surface of the ovary. This opening is cicatrised, at least externally, in about eight or ten days, so as to prevent the escape of the blood which proceeds from the lacerated vessels of the vesicle, and, in consequence, a clot is frequently formed in the capsule of the vesicle (fig. 38). Sometimes it contains a serous fluid, colourless, or tinged with blood.

A careful examination of the facts connected with menstruation, appears to me to justify the following conclusions:—

1. That ovarian influence is necessary to menstruation: *a.* because when the ovaries are congenitally absent, or have been removed, or have become disorganized, menstruation is absent or ceases. *b.* Because, when the uterus is absent or has been removed, the ovaries being present,

which communicated with the opening in the peritoneal coat of the ovum, with a firm coagulum.

"On the 18th of November, 1832, Dr. Girdwood and Mr. Webster removed the uterine organs from the body of a young woman who had died suddenly the preceding day, when the catamenia were flowing. Both ovaria were remarkably large; and both fallopian tubes were red and turgid. The peritoneal coat of the left ovarium was perforated, at that extremity which was nearest to the uterus, by a circular opening, around which aperture, for several lines, the surface of the ovarium was slightly elevated, and of a bright scarlet colour. The margin of this opening was thin and smooth, and did not appear to have been produced by any external force. Its centre was slightly depressed below the level of the edges, but there was scarcely the appearance of a cavity beneath. The right ovarium was much larger than the left; and when cut into, a cyst or cavity was seen, filled with half coagulated blood. The peritoneal coat of the ovarium was entire. The uterus was large, and, when cut into, appeared to contain an unusual quantity of blood. The inner membrane was of a bright red colour, and coated with a thin layer of catamenial fluid. Both fallopian tubes were red and turgid, and the interior of the left was filled with menstrual fluid.

"On the 14th of January, 1837, a woman, thirty-seven years of age, who had long suffered from hysteria, died suddenly in St. George's Hospital during menstruation. No morbid appearance was found to account for her death. A small circular aperture was observed in the peritoneum of the left ovarium. This opening communicated with a cavity in the substance of the ovarium, which was surrounded with a soft yellow substance, of an oval shape.

"On the 31st of May, 1841, Mr. A. Shaw was present at the inspection of the body of a woman who died during menstruation in the Middlesex Hospital. In the right ovarium, he says, the appearance was presented of one of the Graafian vesicles having been recently ruptured. A part of the surface, of the size of a four-penny piece, was distinguished by a dark stain upon it; and here the peritoneal coat was slightly elevated, and the ragged edges towards the centre of the stained spot were of a particularly black colour."

In Gendrin's Traité Philosophique de Médecine Pratique (1839), there is a description of the same state of the ovaria in five women who died during menstruation. In the first, the left ovarium was vascular, and in the middle was an aperture about a line in diameter, with an irregular margin. Its cavity would have contained a hemp-seed, its walls were red, and it was obviously a ruptured Graafian vesicle. In the second case, a small circular ragged opening led to a cavity two lines in diameter, the walls of which were of a bright red colour. In the fourth, the right ovary had an aperture a line and a half in diameter, leading to a small cavity, with vascular walls. M. Negrier has given an account of similar appearances in the ovaria during menstruation. On the other hand, the recent observations of Dr. Ritchie on this subject seem to have led him to different conclusions—"that although such a discharge from the ovisacs takes place *most frequently* at the menstrual period, yet that the two occurrences are not necessarily co-existent, for menstruation may take place without any such rupture; whilst, on the other hand, the maturation and discharge of mature ova may occur in the intervals of menstruation, and even at periods of life when that function is not taking place."—(*Carpenter's Human Physiology.*)—EDITOR.

Fig. 38.

the menstrual molimen still recurs periodically. *c.* Because, coincident with the commencement and cessation of menstruation, we find corresponding organic changes in the ovaries.

2. We find that the ovaries do not contain a definite and limited number of Graafian vesicles, as Haller and others have thought, but a vast assemblage, according to the researches of Dr. Martin Barry, and the number of which vesicles may be increased, according to Dr. Ritchie.

3. In the ovaries of women who menstruate regularly, there may be observed a number of the Graafian vesicles, in different degrees of development, from the size of a millet seed to that of a cherry stone.

4. There are cases on record of women who died just before menstruating, in one of whose ovaries a vesicle was observed in a state of great maturity, enlarged and prominent, with its outer coverings much thinned, semitransparent, and in one point apparently about to burst.

5. In a considerable number of cases of death during menstruation, one ovary presented a cavity recently emptied, or partially filled by a clot, from which a duct-like canal passed through the coats of the ovary. That this cavity contained a Graafian vesicle cannot reasonably be doubted.

6. On examining the ovaries, a number of cicatrices may be observed, some more, some less recent; and in several cases these have been ascertained to correspond exactly with the number of the menstrual periods. According to Mr. Girdwood's researches, this is always the case.

7. These cicatrices, when cut open, exhibit the yellow spots which have been so often alluded to in all the controversies about *corpora lutea*.

8. Cases are on record in which (according to Dr. Ritchie) menstruation has taken place without the escape of a vesicle, and others, also, in which there was evidence of the escape of a vesicle previous to menstruation. This latter case has occurred more frequently than the former, (and answers to those cases in which conception has preceded menstruation, or occurred during lactation,) but both are so rare as scarcely, if at all, to affect the question.

9. From all this evidence we are obliged to conclude that there is a periodical evolution of Graafian vesicles, and that this occurs at a menstrual period.

110. The *uterus* is congested during menstruation; its vessels are distended with blood, its substance more flaccid than usual, of a more decided pink colour, and its lining membrane of a deep red, studded with bloody points, and covered with menstrual fluid. The cervix, however, participates but slightly in the increased vascularity, and its lining mem-

brane is scarcely altered in colour, so that the *os uteri internum* is marked by the abrupt termination of the dark colour of the lining membrane of the body. On making a vaginal examination, we find the cervix softer, more puffy, and slightly swollen, and the os uteri more open, than at other times. The *Fallopian tubes* are also somewhat more vascular than usual.

These changes rapidly subside when the function ceases, and the parts return to their ordinary state.

111. The *final cause* of menstruation is said to be, 1, to get rid of the surplus blood employed during gestation in the nutrition of the fœtus, but which in the unimpregnated state might be injurious; and, 2, to prepare the uterus for impregnation and conception. The first is a mere hypothesis, grounded on an assumption, for it is not proved that there is any surplus blood when the female is not pregnant; I need, therefore, say no more about it.

As to the second theory, it is based upon the observation, that conception seldom or never takes place before the period of the first menstruation, or puberty; that it does not occur in those who do not menstruate, or after the cessation of menstruation; and that calculations show that it takes place more readily soon after a menstrual period. This has been the received opinion for some time, and may be the true one; but I should be to blame if I did not point out some considerations which, if confirmed by more extended investigation, may lead to another view of the matter; viz., that menstruation is for the relief of a certain condition of the organs which occurs periodically, and which condition is a preparation, not for menstruation, but for conception.

For instance, 1, we find congestion of the uterus and ovaries, with certain changes in the Graafian vesicles, occurring at menstrual periods, analogous, to a certain extent, with those which take place at and immediately after conception; the difference being, that, if no fecundating stimulus be applied, the vesicle bursts and its contents are lost.

2. By various writers, Reaumur, Cruikshank, Blundell, Laycock, &c., menstruation is regarded as analogous to the "heat" of animals, and the similar condition of the organs seems to confirm this view; but conception in animals takes place during, and not after, the "heat."

3. I am not sure of the correctness of the calculations which place conception immediately after menstruation. In reckoning for the time of delivery, women calculate from the mid-period between the last menstruation and the first omission, or, in other words, from a fortnight after the last menstruation. Now it follows, that, so far as the regularity of gestation can be depended upon, if conception take place more readily immediately after menstruation, they ought actually to anticipate the calculated period of delivery just so much; or, on the other hand, to exceed the period fixed upon, if conception take place just before a menstrual period. This brings the question within the reach of experience, and I cannot but think that more women overrun their calculations than anticipate them; and, if so, the evidence is in favour of the changes at a menstrual period being preparatory to conception.

4. It does not appear that the discharge of the catamenia is absolutely necessary to impregnation; for cases not unfrequently occur in which impregnation takes place without previous menstruation; such a one has

recently come under my care. Other cases are recorded by Perfect, Reid, Velpeau, &c. in which the menses appeared for the first time during gestation; and some by Deventer, Baudelocque, and Dewees, who only menstruated during pregnancy. Lastly, it is not uncommon for women to conceive during lactation, or immediately on weaning, before the catamenia appear.

Now, from these cases alone, it is evident that it cannot be assumed that menstruation is an essential preparation for conception; and it may be more correct to consider it as the ordinary termination of a series of changes which had another object, and would have terminated differently, had not the proper stimulus been wanting.*

* On this point we have conflicting testimony. The late Dr. Dewees, whose experience was very extensive, wrote as follows: "The final cause of the menses is perhaps enveloped in some obscurity; but of this we know at least one incontrovertible fact, namely, that the healthy performance of this function is in some way or other connected with the capacity for impregnation; as *no well-attested instance is upon record, where this has taken place in a female who never had had this discharge*, or even when it was not of a healthy character, and with a greater or less degree of regularity." In these remarks we must understand Dr. Dewees as merely asserting his own experience, for the experience of numerous equally competent observers is in direct opposition. The regular and healthy performance of the menstrual function is certainly indicative of a natural condition of the female genital organs, and of the consequent aptitude of the individual for impregnation; yet it is not always so; every healthy menstruating female is not fruitful; and I have known many instances where women bore children regularly, although the menstrual office was neither regularly nor healthfully performed. Professor Dunglison well observes: "As a general rule, the appearance of the menses denotes the capability of being impregnated, and their cessation the loss of such capability. Yet, females have become mothers without ever having menstruated. Foderé attended a woman who had menstruated but once—in her seventeenth year, although thirty-five years of age, healthy, and the mother of five children. Morgagni instances a mother and daughter, both of whom were mothers before they menstruated. Sir E. Home mentions the case of a young woman, who was married before she was seventeen, and having never menstruated, became pregnant; four months after her delivery, she became pregnant again; and four months after the second delivery, she was a third time pregnant, but miscarried. After this she menstruated for the first time, and continued to do so for several periods, when she again became pregnant; and Mr. Harrison, at a meeting of the Westminster Medical Society, remarked, that he knew an instance in which the mother of a large family had never menstruated.* Such instances prove that ova are maturated without the ordinary recurrence of a sanguineous exhalation from the lining membrane of the womb."

The modern ovular doctrine of menstruation is unquestionably encompassed with some difficulties: these have caused it by a few to be considered rather as "a plausible and ingenious hypothesis, than as a well-established theory." Mr. Kester, in the *London Medical Gazette*, (Nov. 1849,) thinks that "the actual state of our knowledge of the nature of menstruation may be expressed in the following propositions:—

"1. Menstruation is a *periodical* function of the uterus.

"2. Ovulation is the *constant* function of the ovaries.

"3. Ova are matured in the ovaries at all ages, but more rapidly during menstrual life.

"4. Ova are discharged at all periods of female life, in the intervals of, as well as at the time of, menstruation.

"5. Ovulation and menstruation being often concurrent, indicate that they are both the result of the attainment of a certain point in the development of the female economy.

"6. The law of periodicity in the one not obtaining in the other, leaves still wanting the inseparable link in the chain of causation whereby menstruation can be shown to be the effect of ovulation.

"7. At the menstrual period, the ovaries experience an extension of the uterine

* Human Physiology, 4th edition, vol. ii., p. 357.

Abnormal deviations.—These are of sufficient importance to demand a separate chapter; we shall therefore next consider the disorders of menstruation.

CHAPTER II.

DISORDERS OF MENSTRUATION.

112. These functional derangements are divided into three classes: 1, Amenorrhœa; 2, Dysmenorrhœa, or difficult menstruation; and 3, Menorrhagia, or excessive menstruation. Each will require a separate though brief notice.

113. 1. Amenorrhœa may be divided into two classes: *emansio mensium*, when the menses have never appeared; and *suppressio mensium*, when, having been regular, they are obstructed. In considering absent menstruation as a disease, the reader will bear in mind the difference of age at which the catamenia appear, as it is not intended to include late menstruation, as such, in the present class.

114. *Emansio Mensium.*—Menstruation may be absent from *congenital malformation.* The ovaries may be wanting, or, if present, they may be

congestion, and become, equally with the uterus, the seat of increased functional activity.

"8. The menstrual flow is a true hæmorrhage, as shown by chemical analysis, and by the phenomena of disease."

In connection with this subject, the following case, recorded by Dr. Janzer, in the *Medicinische Annalen*, vol. xiii., p. 4, is in the highest degree interesting. It illustrates the changes which the mucous membrane of the uterus undergoes during the menstrual period.

The young girl who was the subject of the observation had menstruated four days before being murdered. She had never been pregnant. Her body was examined sixteen hours after death. The surface of the left ovary presented a deep red spot, surrounded by finely injected vessels. The spot was formed by a small globular mass, imbedded in the ovary, and of an intense red throughout its whole thickness. This mass was separated from the tissue of the ovary by a thin yellow envelope, and was composed of fibres like those of areolar tissue, arranged in superimposed layers. The yellow envelope was formed by the same kind of fibres, among which was a pretty considerable quantity of fat, not contained in cells. Near this body there was seen a small, yellow, spherical, modulated mass, composed of areolar tissue and fat. The right ovary contained two yellow bodies. The Fallopian tubes, which did not embrace the ovaries, were tumefied in the upper two thirds. On slight pressure, a white matter issued from them, resembling pus, and entirely composed of round epithelial cells, some of which were furnished with vibratile cilia. No ovule, nor any traces of spermatozoa, were found.

The uterine mucous membrane, between the body and the neck, was much swollen. In the uterus itself, it formed a velvety membrane, glossy and brilliant, easily detached with the handle of the scalpel, and presenting a fine network of vessels. This mucous membrane was evidently thickened; it was composed of the uterine glands, ranged perpendicularly alongside each other, and fitted with cylindric epithelium, not ciliated. The structure between the uterine glands was composed of a network of delicate fibres, of some nucleated cellular fibres, and of amorphous tissue. The surface of the uterus was covered with a thin layer of mucus, and lined with cylindrical epithelium, without cilia. The orifices of the Fallopian tubes were open. The vaginal mucous membrane was pale, but was only covered with a thin layer of mucus, containing epithelial cells.

It results from this observation, that the mucous membrane of the uterus presents, during menstruation, characters analogous to those which exist during gestation; such as the hypertrophy of the uterine follicles, and the disappearance of vibratile cilia.—*Lond. Journ. of Med.*, from *Gaz. Méd. de Paris*, March, 1850.—Editor.

atrophied or diseased; the vesicles may be diseased or absent. But, although the ovaries be well developed, other organic irregularities may prohibit the periodic evacuation: for example, the uterus may be absent, or incompletely developed; the canal of the cervix may be closed, the os uteri impervious, the vagina absent; its sides adherent or its orifice closed by adhesion, false membrane, or an imperforate hymen.

When the defect is ovarian, we find no effort at menstruation at all; the body is generally pretty well developed, and its functions (except the one) tolerably correct; but the sexual characteristics are wanting. When the uterus is absent or defective, on the contrary, these sexual peculiarities are observed, and there is an effort at menstruation every month, but of course no discharge. There is a considerable difference, however, when the passage merely is obstructed; then the menses may be secreted, and retained in the cavity of the uterus or vagina, until from over-distension the parietes give way.

115. The *diagnosis* will depend upon these peculiarities, and the *treatment* must be adapted accordingly. Nothing effectual can be done if the uterus or ovaries be absent; but, in occlusion of the os uteri or vagina, an effort must be made to remove the obstacle. The os uteri, or canal of the cervix, may be pierced by a pointed probe, a trocar, or an instrument like that used by Mr. Stafford for strictures of the urethra. An artificial vaginal canal may be formed by the knife, or by forcibly separating the parietes. Occlusion of the vaginal orifice may be remedied by the knife or trocar. Great care will be required after any of these operations; leeches, cold lotions, fomentations, or poultices may be necessary. A piece of lint, spread with simple cerate, should be introduced into the opening to prevent the formation of new adhesions.

116. *Simple Amenorrhœa* is the name given to those cases where the sexual system is developed, the signs of puberty present, but where no discharge at all escapes from the vagina. The subjects of this disease may be of robust habit of body, or weak, pale, and delicate. In the former, the constitutional suffering is more severe, with some febrile action, flushed face, headach, full pulse, &c. In the latter, the sympathies of distant organs are manifested more slowly, and there is little, if any, febrile action. They appear, in fact, something like the acute and chronic stages of other diseases. In either, an attempt at menstruation may be made every month, accompanied by rigors, pain in the back and loins, weight at the lower part of the abdomen, aching along the thighs, general lassitude and uneasiness, &c. &c., without any discharge. But, though these symptoms pass away, another series arise: the patient complains of frequent headach, sometimes with intolerance of light and sound, throbbing and a sense of fulness in the head, pain in the side or back; the stomach and bowels become irregular, the countenance pale, and the strength reduced. Paroxysms of dyspnœa and hysteria may also occur, and the patient acquires the appearance of confirmed ill-health. Of course, these symptoms will differ in different constitutions; and cases occur occasionally, in which a long continuance of amenorrhœa has but slightly disturbed the general health.

A vaginal examination with the finger or bougie affords no information in these cases.

The *causes* of this variety, says Dr. Locock, "are generally to be found

in the previous habits of the patient; for it is most frequently met with in those who have led sedentary and indolent lives, who have indulged in luxurious and gross diet, and been accustomed to hot rooms, soft beds, and too much sleep."

The *proximate* cause is probably some peculiar condition of the ovary in the majority of cases.

The *diagnosis* must be formed upon the fact of there being a menstrual effort or not; and, if there be, upon the existence or non-existence of obstructions. If the menstrual molimen occur, and there be neither obstruction nor discharge, we may conclude the case to be one of simple amenorrhœa.

117. The *treatment* must depend upon the constitution of the patient, and will vary as it is administered during an interval, or at a menstrual period. In patients of a full habit, venæsection will often afford relief. This must be followed during an interval by a diminution in the quantity of the food, absence of stimulants, exercise, and occasional purgatives. When the patient is of a weak, nervous, or leucophlegmatic constitution, the system should be strengthened by generous diet and the moderate use of wine, with gentle exercise. Preparations of iron will be found very useful. By the older writers a long list of emmenagogues is given; but modern experience has reduced the number. Iodine, strychnine, electricity, and iron, certainly seem to have a direct power on the uterus, and may be given advantageously. Stimulating injections into the vagina or uterus have been recommended, but they are very questionable. M. Carron du Villard has succeeded with the cyanuret of gold, Dr. Loudon by leeches to the breasts, Sir J. Murray by cupping-glasses to these organs, Rostan by leeches to the os tincæ, Soult with aconite, Hannay with the ammoniated tincture of guaiacum, and Schönlein by enemata of aloes. Stimulating the neighbouring organs (the rectum and bladder) is often beneficial.*

* The author has shown less than his wonted clearness on this subject; indeed, he appears to have fallen into the common error of regarding amenorrhœa as a disease; whereas it is only an occasional symptom—merely the non-performance of a function not always necessary for the health of the individual, even during the period of female life when it usually occurs. It has been shown (page 85) that women may likewise bear children without menstruating. I know a maiden lady, now nearly fifty years old, who has generally enjoyed very good health, although she never menstruated more than twice a year, and sometimes only once in twelve or fifteen months. Amenorrhœa, therefore, is not properly a disease, but a consequence of either individual organization, disorder of the uterus or ovaries, or of some other organ or organs sufficiently important to affect materially the patient's constitution. When it is the consequence of peculiar organization, of course all attempts to excite or produce the discharge will be vain, and most likely pernicious; where it depends upon disorder of any one or more organs, it is obvious that the pathological condition must be sought out and removed before we can hope that the menstrual or any other of the deranged functions can be restored. Viewed in this light, all the means that restore the system to health, medicinal or hygienic, may be regarded as emmenagogue; but that we possess any article having the direct power of causing or restoring the secretion, apart from its property of overcoming some morbid condition of the uterus or ovaries, or other organ affecting the general health of the individual, has not yet been proved, nor is it probable that any such exists. Nothing can be more opposite and heterogeneous than the articles commonly prescribed as emmenagogues; and it is therefore with justice that they are classed by Dr. Ferguson as "nostrums." The little confidence reposed in such agents has induced some practitioners to attempt the restoration or establishment of the discharge by the means referred to above of a more direct nature. In some instances of mere torpor, electricity has been useful in exciting the capillaries to greater activity by

118. *Amenorrhœa, with vicarious Uterine Leucorrhœa*, differs essentially from the preceding varieties, inasmuch as uterine secretion exists, whereas in them the uterus was quiescent. The product is a white or colourless fluid, and, so far, not the menses; but the symptoms of menstruation occur, and the patient does not require medicine acting directly upon the uterus. I have already alluded (§ 105) to the leucorrhœa, which occurs at the commencement of menstruation, and which is generally superseded by the menses after one or two periods. It is only when this change does not take place that we need interfere. The white discharge may continue periodically to usurp the place of the catamenia; but, in addition, it often continues during the interval.

119. *Treatment.*—When the white discharge is persistent, the case is one of uterine leucorrhœa, and requires the appropriate treatment; but when it occurs only at intervals, as vicarious of the menses, our object should be to strengthen the constitution by generous diet, exercise, bathing, &c., and tonic medicines. I have found great benefit in such cases from the carbonate of iron.

120. *Suppressio Mensium.*—A suppression of the menstrual discharge may occur suddenly, or more gradually; in other words, it may be acute or chronic.

121. Among the causes of *Acute Suppression of the Menses* may be mentioned cold caught during their flow, by wet feet, &c.; sudden mental emotion, or a bodily shock, fear, disease, &c.

The amount of disturbance consequent upon the sudden arrest, varies a good deal. Most frequently a degree of fever results, with headach, hot skin, thirst, quick pulse, &c.; or the patient may be attacked by local inflammation of the brain, lungs, intestinal canal, or of the uterus itself. Sometimes, instead of inflammation, we see attacks of hysteria simulating inflammation, or of neuralgia of different parts. Occasionally derangements of the senses, aphonia, imperfect vision, &c., or paralysis and apoplexy follow.

The sudden suppression, from a definite cause, will distinguish this form of amenorrhœa from all others.

122. *Treatment.*—The first object is to recall the discharge, if possible. For this purpose the patient should take a hip-bath or pediluvium, and swallow some warm drinks. Mild diaphoretics and gentle purgatives will also be useful. Should all our attempts fail, we may content ourselves with mitigating the severer symptoms, until the approach of the next menstrual period, when the diligent use of the ordinary remedies

its direct impression on the nerves of the uterus; but it is a means which is adapted to a very limited class of cases. "Stimulating injections into the vagina and uterus," are indeed questionable—into the latter organ, imminently dangerous. This is the expression of Bretonneau, Ricord, and several other respectable authorities. "M. Hourmann relates a case where violent abdominal pain, followed by metro-peritonitis, was caused by the injection of a decoction of walnut leaves into the uterus, for the cure of an obstinate leucorrhœal discharge, which had been traced to come from the cavity of that organ. Wishing to ascertain whether these dangerous symptoms could be produced from a portion of the fluid having passed through the Fallopian tubes into the cavity of the abdomen, he found, on injecting fluid into the uterus after death, that *such was actually the case.*" If the opinion now prevalent with physiologists shall be established, that menstruation is intimately connected with, or dependent on, the maturation and shedding of Graafian vesicles, it is manifest that little good can be expected from articles that are not calculated to impress favourably the ovaries.—EDITOR.

(hip-bath, purgatives) will probably be followed by the proper secretion, or by a colourless discharge. If neither take place, then we must have recourse to some of those remedies, already mentioned, which act directly upon the uterus.

123. *Chronic Suppression of the Menses* may be the issue of an acute attack, or it may arise from the gradual supervention of delicate health, or from disease of the ovaries, uterus, &c., or it may occur as the termination of menstruation. The quantity of the discharge may diminish, and the periods become irregular, until at length the function ceases. But very often the menses are superseded by leucorrhœa, at first periodic, but ultimately persistent.

The *symptoms* which develope themselves are headach, loss of appetite, pain in the side and back, debility, and general deterioration of health.

The most important point for *diagnosis* is to distinguish this form of suppression from pregnancy, and which mainly rests upon the absence of the usual signs of pregnancy.

124. *Treatment.* — When the suppression has been the result of disease, upon its removal the catamenia will return; and if it has been caused by leucorrhœa, the proper treatment of that disease will generally end in the restoration of the menstrual discharge. When the suppression is uncomplicated, the remedies for simple amenorrhœa may be tried; but caution will be necessary, and a careful estimate of the general condition of the patient, together with a vaginal examination, in order to make sure that there is neither organic disease, nor obstruction of the womb, and that the case be not one of premature but normal cessation of the menses.

125. *Vicarious Menstruation.* — This is a very curious deviation from normal menstruation, and seems a provision for, in some degree, mitigating the constitutional effects of suppressed menstruation, by substituting a similar discharge from some other part. It is recorded to have taken place from the nostrils, eyes, ears, gums, lungs, stomach, anus, bladder, nipples, the ends of the fingers and toes, from different joints, from the axilla, from the stump of an amputated limb, from ulcers, from varicose tumours, and from the surface of the skin generally. The more extensive mucous membranes are, however, most frequently the seat of the discharge. It appears to be sometimes blood; in others, it has the characters of catamenial fluid, being dark-coloured, thin, and not coagulable. The repetition of this discharge may occur at the regular period, or it may intermit; and it does not appear that any serious result follows, even when delicate organs are the seat of it. Sooner or later the uterus resumes its functions, and the attack ceases.

126. *Treatment.* — After this discharge has once occurred, it will be proper to take measures to relieve the system in a less questionable manner, by venæsection, cupping, or leeches, and a careful watch will be necessary. If the evacuation take place from the lungs or stomach, opium combined with lead or bismuth, and the mineral acids, will be found beneficial. During an interval, the patient may be treated much in the same way as for amenorrhœa, and occasionally we may try some of the direct remedies.

127. 2. Dysmenorrhœa, *difficult or painful menstruation.*—This form of abnormal menstruation, consists of severe pain in the secretion or emission of the discharge, which may be scanty, profuse, or about the

usual amount. The attack is occasionally confined to one or two periods, but more frequently lasts for a longer time, and sometimes for many years. From the different character of the pain and constitutional symptoms, I have divided the disorder into three species, — neuralgic, inflammatory, and mechanical dysmenorrhœa.

128. *Neuralgic Dysmenorrhœa.* — This variety may occur at any age, but is more frequent after the thirtieth year than before; in unmarried than in married women, and, if married, in those who have not borne children. It is almost confined to those of a nervous temperament, and of a thin delicate habit. The monthly paroxysms present all the characteristics of neuralgia; and I am very much inclined to agree with Dr. Tyler Smith that the chief seat is in the ovaries. For a short time previously, there is a sense of general uneasiness, a deep-seated feeling of cold, and headache, sometimes alternating with pain in the back. The latter commences in the region of the sacrum, and extends round to the lower part of the abdomen, and down the thighs. The amount of suffering varies; but it is sometimes very great. After a longer or shorter period, the catamenia appear, sometimes slowly and scantily, in others, in slight gushes. The quantity differs in different persons, and in the same person at different times. The quality of the discharge may be unchanged, but we frequently find it paler, and occasionally mixed with small clots.

In some cases, there is a membrane, composed of plastic lymph, discharged either in shreds, or in the form of the uterine cavity which it has lined. It seldom occurs regularly, contrary to the opinion of Dr. Denman. It was first, I believe, described by Morgagni; and since by Denman, Burns, and other obstetric writers. Dr. Simpson has recently expressed an opinion that these productions "are not the results, as is generally supposed, of fibrinous or plastic *exudations upon* the free surface of the uterus, but that they consist of *exfoliations* of that membrane itself." At present I confess I am not prepared to agree with the able and learned Professor. Denman states that he never knew a woman conceive by whom this membrane was secreted; but this conclusion appears to be too general. Conception is rare under such circumstances; but it has occasionally taken place.

The symptoms enumerated are not always mitigated on the appearance of the menses; the pulse is scarcely quickened, nor is there any feverishness. The duration of a period is variable. In some cases there is comparatively little constitutional injury sustained, but in others the patient's health is much deteriorated.

The cervix uteri undergoes the change usually observed during menstruation, but nothing else is detected by an internal examination.

From an attentive examination of these cases, I have been led to the conclusion that the disease is generally of a simple neuralgic character. Probably in those cases where the membrane is discharged there may be, as Dr. Locock thinks, a degree of inflammation of the mucous membrane, of a peculiar kind.

The *causes* are cold, sudden shocks, mental emotions, &c. acting upon an irritable condition of the womb.

129. *Treatment.* — The indications are two-fold: first, to reduce the pain during an attack; and, secondly, to prevent its return, by appropriate remedies during an interval. The first indication is best answered

by sedatives, opium or some of its preparations, hyoscyamus, conium, &c. which may be given alone or in combination with camphor. Should the stomach be irritable, they may be exhibited in an enema. I have remarked that the discharge increases when the pain is relieved. Other remedies have been tried with success; as, the acetate of ammonia by Massuyer, Cloquet, and Patin; ergot of rye, by Dewees and Gooch, &c. &c.

During the intervals, every effort should be made to strengthen the patient, and to diminish general and local irritability. The diet should be nourishing, and plenty of exercise in the open air should be taken by the patient. Chalybeate waters or some preparation of iron may be given. Dr. Locock speaks highly of a mixture of equal parts of *vinum ferri* and the *spirit. æther. sulph. co.*, of which from half a drachm to a drachm may be taken two or three times a day. Dr. Dewees has tried the *tinct. cantharid.*, and Dr. Chapman the senega root, with success. A blister to the sacrum, or a caustic issue, is often of great use; and I have seen much benefit derived from the daily use of vaginal injections of tepid or cold water, during the interval. On the approach of the next period, warm water should be substituted, and the patient should use a hip-bath or pediluvium for two or three nights in succession, antecedent to the eruption of the menses. Since the first edition of this work I have succeeded in curing a case of this kind, in which the false membrane in shreds was discharged every month, by repeated applications of the caustic tincture of iodine to the cervix uteri. This is by far the most obstinate variety of the disorder.*

130. *Inflammatory Dysmenorrhœa.* — The subjects of this form differ as widely from those of the former as its symptoms. It occurs in females of a full habit and of a sanguine temperament, in the married as well as in the unmarried, and in those who have borne children. Few precursory symptoms announce the attack; a degree of restlessness and feverishness, rigors, flushing, and headach, generally precede the severer symptoms. For some time before and after the catamenia appear, the suffering is very great; the patient complains of pain across the back, aching of the limbs, weariness, and intolerance of light and sound; the face is flushed, the skin hot, and the pulse full, quick, and bounding. Delirium occasionally supervenes. Most frequently the symptoms are mitigated when menstruation takes place, and by degrees subside. The discharge is generally sufficient, and in some cases is accompanied by the secretion of the plastic membrane spoken of above.

During the intervals, the health of the patient is little affected; she may be subject to headachs and pain in the side, but these are generally transient, and do not interrupt the functions of the different organs. Uterine

* In a few instances, I have derived advantage from the administration of ten grains of ergot, morning, noon, and night, commencing three or four days before the expected attack, and continuing it daily until the period arrived. As soon as the attack commences, I have always found it advisable to moderate its violence by sending the patient to bed, applying warmth to the feet and to the vulva, and administering some of the preparations of opium. Three grains of opium as a suppository, or sixty drops of laudanum, suspended in a tablespoonful of mucilage, as an enema, has always afforded great relief at the time, and, apparently, lessened the disposition to a return at the next period. In severe cases, it may be proper to repeat the anodyne every day until the pain ceases. — EDITOR.

leucorrhœa is not unfrequently present during the interval. An internal examination during the attack affords evidence of some congestion of the uterus; the cervix is swollen, and the heat of the parts increased. Dr. Dewees has noticed pain and swelling of the breasts as an occasional accompaniment of this form of dysmenorrhœa.

A severe attack of either variety has the effect of precluding conception; but I have repeatedly known conception to take place in spite of and with benefit to slighter cases.*

131. *Treatment.* — The success of remedies in this variety of dysmenorrhœa affords a confirmation of its character. Venæsection, cupping the loins, leeches, or scarifications to the cervix uteri, afford the quickest relief. They should be followed by saline purgatives, with febrifuge medicines, and cooling drinks. When by these means the inflammatory symptoms are subdued, a dose of calomel and opium at bed-time is often very useful.

During the interval great benefit may be derived from judicious management. The patient should take active exercise, and be as much as possible (if the weather be fine) in the open air. Walking is preferable to riding or driving. Brisk purgatives, and the aloetic are the best, should be regularly administered; and on the approach of the next monthly period, if much excitement arise, it may be well to abstract blood by cupping before the regular attack comes on.

132. *Mechanical Dysmenorrhœa.* — I have applied this title to a difficulty in the emission of the menses, caused by a narrowing or stricture, in some part of the canal of the cervix. What may be the cause of this diminution of calibre, whether it be congenital or the result of inflammation, is not easy to determine; but there can be no doubt of its existence. Capuron enumerates it among the causes of dysmenorrhœa; and the late Dr. Macintosh, of Edinburgh, states that he repeatedly detected it. I found it remarkably evident in a case I attended with Dr. Charles O'Reilly of this city. It may occur at any part of the canal, and the degree of obstruction may vary up to complete closure. I apprehend that there can be little doubt, that dysmenorrhœa may result from this cause, though I am far from thinking it so common, as was supposed by Dr. Macintosh; neither do I believe that, even where it exists, it is always the cause of the difficulty and pain. In the case I saw, although we cured the stricture, the dysmenorrhœa continues to this day. Nor, even in Dr. Macintosh's cases, is there sufficient evidence to prove his point, for he does not show that there was any retention of the menses, but merely, that at subsequent periods menstruation was easier and more abundant: this might have arisen from the direct stimulus to the uterus afforded by the introduction of bougies.

133. *Treatment.* — The fact that such a stricture of the canal of the cervix has been observed, should lead us to make an examination with a small-sized bougie, in all cases of very obstinate dysmenorrhœa. Such an examination is neither difficult, painful, nor injurious, if proper caution be observed. Should stricture be detected, the remedy is the repeated introduction of bougies about every second or third day, and increasing

* According to Dr. Ashwell, when pregnancy occurs during the continuance of the disease, "the patient is exposed to the risk of abortion."—(*Diseases of Females*, Philada. Ed. p. 80.)—EDITOR.

in size, until the obstacle be overcome. No force must be used; and, if any irritation manifest itself, it must be allowed to subside before the operation be repeated.

Dr. Simpson has invented an instrument for the division of the cervix in these cases; but I rather think the object can be more safely attained by dilatation, and quite as satisfactorily.

134. 3. Menorrhagia.—I shall follow Dr. Locock's example, and apply this term to an increase in the monthly evacuations, whether accompanied by blood or not. Excessive menstruation may occur in various ways: the menses may return too frequently, or too copiously, or at unusual intervals, as during gestation and suckling. Some allowance, also, must be made for differences of constitution, and perhaps of climate.

I have observed three distinct forms of the disease. In the first, the discharge is of the natural quality, but the quantity or frequency of recurrence is greatly increased. In the second, the discharge is large, and occasionally mixed with blood; but no change in the condition of the body or neck of the womb can be detected by an internal examination. In the third, there is a considerable loss of blood, with a marked change in the size and position of the uterus. Let us examine each of these varieties in detail.

135. *The first variety of Menorrhagia* occasionally commences with a sudden and violent gush from the vagina, after which it stops for some hours, and then recurs; and this alternation may continue during the usual period of menstruation. Sometimes, on the other hand, the discharge goes on regularly, but lasts for ten days or a fortnight, or even three weeks; or, the quantity each time not being excessive, it may return every two or three weeks; and, although this latter case is most frequently met with in women who have borne many children, I have seen it occasionally in unmarried females. It is, also, more than the others, connected with that state of the lining membrane which gives rise to uterine leucorrhœa.

The symptoms are exactly those we might anticipate from the long continuance of a debilitating discharge. Exhaustion, languor, indisposition to exertion, weakness across the loins and hips, pallor of countenance, headach, throbbing of the temples, tinnitus aurium and giddiness, occur more or less in these cases. If relief be not obtained, and especially if uterine leucorrhœa be present, all these symptoms will be aggravated. The exhaustion and languor increase, the face becomes sallow, an aching pain is felt across the loins and round the lower part of the abdomen, pain in the left side, repeated and severe headachs, derangements of the stomach and bowels follow, and, in short, all the secondary symptoms and disturbance of the general health which result from amenia, no matter how produced. In some extreme, but rare cases, we have diarrhœa and anasarca, with nervous symptoms, melancholy, and even epilepsy, resulting from the disease. Nothing is discovered by a vaginal examination; there is neither swelling nor increase of heat about the uterus; the os uteri is slightly open, as usual during menstruation, but there is no tenderness.

Among the causes we may enumerate repeated child-bearing, over-suckling, excessive coition, cold, mental emotion, &c.

136. *Treatment.*—The first indication is to remove the cause; if it

proceed from over-suckling, the child should be weaned, and the patient should live "*absque marito.*"

In persons of a full habit of body, when the attack is recent, it may be necessary to take blood from the arm, cup the loins, or apply leeches to the anus. The discharge may be moderated by a combination of the acetate of lead with opium. When this has failed, I have generally succeeded with ergot of rye, in five-grain doses, three times a day. Dr. Locock recommends cold to the vulva, hips, and abdomen, with vaginal injections of cold water; and Dr. Dewees has used a vaginal injection of sugar of lead and laudanum, with rest on a hard bed, twenty drops of elixir of vitriol, and gentle purgatives, with success. I should altogether deprecate injections into the womb, recently advised by French writers, as a very hazardous practice, and which even their own experience does not justify. A far safer, and, as I have found it, a very effectual practice, is to employ enemata of cold water. Plugging the vagina has also been recommended, and as a "*dernier resort*" may be tried, though it is not a very scientific remedy. Dr. Macintosh speaks highly of an enemata containing a scruple of the acetate of lead. The tincture of Indian hemp has a powerful effect upon this form of the disease. It was first tried by my friend, Dr. Maguire of Chapelizod, and on his recommendation by Dr. Hunt and myself, with extraordinary success, both in the number relieved and the rapidity of cure. From five to ten drops, three times a day, in some suitable menstruum, will be found sufficient.

During the intervals, a blister may be applied to the sacrum, and either kept open or repeated. Vaginal injections, at first of tepid and afterwards of cold water, daily, will be found very useful. Benefit will also be derived from sponging the loins and lower part of the abdomen with cold salt-water. Tonics may be given, comfortable warmth preserved, and a generous, but not too stimulating, diet allowed.

137. *The second variety of Menorrhagia* differs from the first, in the discharge of blood which accompanies the secretion. It seldom occurs in unmarried or young females, and generally in those of a leuco-phlegmatic constitution, who have been debilitated by disease or frequent child-bearing. The progress of the disorder is gradual; one or two small clots appearing at first, then an intermission, and a more copious recurrence. After some time, the discharge of blood may be considerable, so as in some cases to produce fainting. It is of course impossible to ascertain whether the catamenia themselves are altered in quantity or quality. A vaginal examination throws no light upon the nature of the disease, the uterus being in its usual state during menstruation. The constitutional effects are similar to those noticed under the first form (§ 135), but more severe, and produced more rapidly.

138. *Treatment.*—The remedies recommended for the former variety are equally available here. Opium, alone or in combination with lead, and ergot, or Indian hemp, during the attack; with counter-irritation to the sacrum, the *douche* to the loins or cold sponging, vaginal injections or enemata, during the interval, are our chief resources.*

* The juice of the common lesser nettle (*Urtica urens*) is strongly recommended by M. Ginestet, in doses of 15 to 30 drachms. In preparing the juice, a quantity of the green herb is bruised, with the addition of a little water, and the fluid portion then strained off by pressing the mass in a linen bag. One dose is said to be generally

139. *The third variety of Menorrhagia* differs considerably from the other two; the discharge is more profuse, and its effects more severe; it is accompanied by marked alterations in the condition and relations of the uterus, occurs at a later period of life, and is more difficult to cure. The attack is not confined to any one kind of constitution or temperament; it occurs in the plethoric and in the debilitated, in the melancholic as well as in the sanguine. I have never seen it in a patient under forty years of age, nor after the cessation of the catamenia.

The attack is preceded for some time by irregularity of the menses, both as to time, quantity, and the duration of each period, with occasional uterine leucorrhœa during the intervals. It is not until the menses have flowed naturally for about twenty-four hours, that the sanguineous discharge appears. Large clots are then expelled, in addition to a great increase in the fluid discharge. At first, the attack lasts seven or ten days only; but in cases of longer standing I have occasionally known it to continue throughout the interval, and terminate after the next period either gradually or suddenly. The quantity lost varies, of course; it is sometimes very large; it was sufficient in one case to excite fears of a fatal result.

The recumbent posture appears to have no effect upon the discharge, there being as much observed during the night as the day. Any exertion or long standing never fails to increase the amount.

During the attack, the patient complains of excessive exhaustion, of a sense of weight in the pelvis, of a dull pain there occasionally, and of weakness of the loins. In all the cases I have seen there was considerable dysuria, especially after long standing: several, indeed, were obliged to lie down, before they were able to evacuate the contents of the bladder completely.

The general health, of course, suffers considerably; the appetite diminishes, the tongue is clean, though pale, the bowels become constipated, the surface blanched, and the strength much reduced.

The pulse is occasionally quickened, but more generally quiet, and enfeebled in proportion to the loss of blood.

An *internal* examination will detect the os uteri somewhat lower in the pelvis and directed more towards the sacrum than usual. It is rather more patulous than ordinary, and the cervix is more or less swollen, especially anteriorly, where it expands into the body. It appears to be tilted forward by its increased weight, so as to press upon the bladder, thus affording a satisfactory explanation of the dysuria which I have noticed in every well-marked case. No increase of heat is observed in the vaginal canal, or about the cervix. The cervix and lower part of the body of the uterus are generally, but not always, slightly tender on pressure. Of course the amount of these alterations will vary in different cases.

The disease must be regarded as congestion of the uterus occurring at the menstrual period, and giving rise by its excess to a rupture of some small vessels. Whether it has anything to say to the production of the organic diseases of the time of life at which it occurs, may not be easy to decide: I think it not improbable.

sufficient to check the discharge. *Ranking's Half-Yearly Abst. from Encyclop. Med. de M. Lartigue*, Oct. 1844. — EDITOR.

The *diagnosis* will not be difficult if we bear in mind the mode of invasion, the character of the discharge, the local characteristics, and the subsidence of the attack.

140. *Treatment.*—Although the complaint appear simple, it is neither easy nor possible in all cases to restrain the hemorrhage by means applied during the attack. I have found opium alone, and in combination with large doses of the acetate of lead, ineffectual. Cold to the vulva and enemata of cold water were equally powerless. Plugging the vagina arrested the discharge for a time, but the irritation it excited seemed to aggravate the other symptoms. Leeches to the vulva had no effect upon it, and the preparations of iron did little or no good. The only remedy, in short, which seems to have the power of controlling the discharge during the menstrual period, is the ergot of rye. It may be given in doses of five or ten grains twice or thrice a day. I have never seen it produce any ill effects in this disease, although I have certainly known it fail altogether.

During an attack, the patient should be kept in a state of perfect rest: she should lie on a hard mattress, covered rather lightly with bed-clothes, but with warmth applied to the feet. All her drinks should be cool and devoid of stimulants, unless she become faint, and then a little wine may be allowed.

At this period, ergot of rye, or any astringent medicine, may be given. If the discharge be not arrested, and show a disposition to continue throughout the interval, it may perhaps be justifiable to inject the vagina with cold water or an astringent lotion. I have never tried this, but have found enemata of cold water answer the purpose very well.

So long as the discharge continues, the employment of the remedies for the *cure* of the disease must be suspended; but, when once it has entirely ceased, not a moment should be lost. A blister should be applied to the sacrum, and either kept open or repeated; I have always found good result from this; the pain in the back generally becoming less severe, and the whites diminishing in quantity. But by far the most powerful means we possess, are vaginal injections of cold water, of a solntion of acetate of lead, or other astringents, two or three times a day. The patient should lie on her back in bed, and the fluid should be thrown up gradually. An almost immediate improvement is the result, followed by the subsidence of all the prominent symptoms, even in those cases which relapse subsequently. The swelling of the uterus will be found upon examination to have disappeared; there is probably scarcely any whites, no pain in the back or weight in the pelvis, and the patient is able to walk about without inconvenience.

When the improvement is so marked as this, there is but little fear (with due caution) that the patient will relapse at the next monthly period; but where the relief, though decided, is not complete—where the disease still lingers, then in all probability the next menstruation will be accompanied with the old symptoms, to be met again and perhaps more successfully by the same remedies.*

* In a recent very interesting treatise on the Diseases of Menstruation, &c., Dr. E. J. Tilt has endeavoured to show: —

1st. That *dysmenorrhœa* is often the result of subacute ovaritis; sometimes the result of the uterine engorgement which it determines.

2d. That *dysmenorrhœa* is often the result of morbid ovulation, and often a symptom

CHAPTER III.

GENERATION.—CONCEPTION.

141. Immediately after the effective intercourse of the male with the female, a series of changes commences, which ultimately issue in the formation of a new being, possessed of individual or independent life. The first step in this process is called Generation, Fecundation, Conception, &c. The period of fecundity in the human female lasts about thirty years, *i. e.* from the fifteenth to the forty-fifth year, or thereabouts; in other words, it is contemporaneous with menstruation.

142. From the hidden nature of the process and the stupendous results, the subject has always possessed the deepest interest for physiologists, and at the same time given rise to a multitude of theories, most of them, to say the least, mere hypotheses. Dr. Allen Thompson, in his valuable paper on Generation, in the Cyclopedia of Anatomy, &c. thus classifies them: "The greater number of the older theories of generation may be brought under one or other of these divisions; viz. the theory of the *ovists*, of the *spermatists*, or of that of *combination*, *evolution*, or *epigenesis*. According to the first-mentioned of these hypotheses, or that of the ovists, the female parent is held to afford all the materials necessary for the formation of the offspring, the male doing no more than awakening the formative powers, possessed by and lying dormant in the female product. This was the theory of Pythagoras, adopted in a modified form by Aristotle: and we shall afterwards see that it resembles most closely the prevailing opinion of more modern times. The terms, however, in which some of the older authors expressed this theory are very vague; as, for example, in the notion that the embryo or new product is formed from the menstrual blood of the female, assisted by a sort of moisture descending from the brain, during sexual union.

"According to the second theory, or that of the spermatists, among the earlier supporters of which, Galen may be reckoned, it was supposed that the male semen alone furnished all the vital parts of the new animal, the female organs merely affording the offspring a fit place and suitable materials for its nourishment. Immediately upon the discovery of the seminal animalcules, these minute moving particles were regarded by some as the rudiments of the new animal. They were said to be miniature representations of men, and were styled *homunculi;* one author going so far as to delineate in the seminal animalcule, the body, limbs, features, and all the parts of the grown human body. The microscopic animalcules were held by others to be of different sexes, to copulate, and thus to engender male and female offspring; and the celebrated Lieuwenhoek, who

of ovarian peritonitis. That, frequently, subacute ovaritis, by determining the inflammatory swelling of the neck of the womb, is a mediate cause of dysmenorrhœa; the painful symptoms being, in many instances, produced by the partial closure of the neck of the womb, and the consequent effusion of menstrual secretion into the peritoneum.

3d. That, in many cases of *menorrhagia*, it is subacute ovaritis, which, by some unexplained process, disposes the engorged uterus to let the vital fluid run in waste.

4th. That subacute ovaritis, by inducing cerebro-spinal reflex action, in certain predisposed subjects, is the most probable cause of hysteria. — Editor.

was among the first to observe these animalcules, described minutely the manner in which they gained the interior of the egg, and held that after their entrance they were retained by a vulvular apparatus.

"The theory of *syngenesis* or combination seems to have been applied principally to the explanation of the reproduction of quadrupeds and man, the existence and nature of the ova of which, were involved in doubt. This hypothesis consists in the supposition, that male and female parents both furnish simultaneously some semen or product; that these products, after sexual union, combine with one another in the uterus, and thus give rise to the egg or structure from which the fœtus is formed. In connexion with this theory, we may also mention that of *metamorphosis*, according to which, a formative substance is held to exist, but is allowed to change its form in order to be converted into the new being; as also the notion of Buffon, that organic molecules universally pervade plants and animals, that these are all endowed with productive powers, that a certain number are employed in the construction of the texture of organised bodies, and that in the process of generation, the superabundant quantity of them proceeds to the sexual organs, and there constitutes the rudiments of the offspring."

It would be mere waste of time to enumerate the modifications of these theories, which have been promulgated in profusion from time to time; of which "groundless hypotheses" Drelincourt reckoned two hundred and sixty-two, and in addition to which, as Blumenbach remarks, "nothing is more certain, than that Drelincourt's own theory formed the two hundred and sixty-third."

143. The best plan will be to state briefly such facts as we possess, which bear upon the conditions of generation and the changes produced by it. We have already ascertained that the ovaries contain certain vesicles, and we have reason to believe that these undergo certain changes before and after a successful coitus, and that their contents, or that of one, constitutes the contribution of the female towards the production of a new being. Again, we know that the testes of the male secretes a peculiar fluid called semen, which in the act of intercourse is projected into the vagina and uterus of the female, and is supposed to exert a peculiar influence upon the Graafian vesicles; but the difficulty has been to explain how that influence is communicated or carried to the ovary. Various theories have been propounded (that of an *aura seminalis*, for example), but none were consistent with the observations made upon other orders of animals; from which it appeared that contact of the semen with the ova was necessary. However, this obstacle has been removed by the recent observations of Dr. Bischoff of Heidelberg, Dr. M. Barry, and Professor Wagner of Berlin, who have detected spermatozoa (seminal animalcules) in the fallopian tubes, especially at their ovarian extremity. This fact confirms the conclusion drawn from comparative anatomy, that contact is essential to generation, and is further strengthened by the experiments of Cruikshank, Haighton, and Blundell, who found that if the fallopian tubes were rendered impermeable, impregnation was prevented: although it does not prove that impregnation may not take place in the uterus in some cases.*

* The question as to how the sperm arrives at the ovarium, has not yet been settled. "Professor Wagner, who is high authority, considers that the sperm reaches the ovary

The experiments of Spallanzani and others have proved that a very small quantity of semen is sufficient for fecundation.

144. Thus, then, we may enumerate as the conditions of generation, the actual contact of the male semen or its spermatozoa with a healthy Graafian vesicle or an ovule. The immediate effect of this contact or of successful intercourse, is the production of great excitement and vascular turgescence of the uterus, ovaries, and fallopian tubes, which lasts for some time, and during which an alteration takes place in the relations of the different parts. The fimbriated extremity of one of the fallopian tubes is turned towards the ovary of that side, and embraces it closely, over the vesicle which has been impregnated. This delicate operation has been attributed partly to the vascular turgescence, and partly, as in certain animals, to muscular action. How soon it takes place after impregnation is not yet determined; it may perhaps occur at each menstrual period as Dr. Tyler Smith supposes.

145. With regard to the ovum itself, the microscopical researches of Von Baer and Barry have proved that its impregnation takes place in the ovarium. After a successful coitus, one or more of the vesicles enlarges and becomes vascular, the vessels converging towards the point, at which the rupture of its coats is to occur. "The fluid," says Dr. Allen Thompson, in the essay already quoted, "contained in the vesicles which are about to burst, previously transparent and nearly colourless, now becomes more viscid and tenacious, somewhat turbid, and of a reddish colour; and in some animals, it is possible in such ripe vesicles, to perceive with the unassisted eye, in a favourable light, a whitish opaque spot on the most prominent part, indicating the layer of granules, or proligerous disc, in the centre of which the ovum is situated. After a certain time a small opening is formed at the most prominent part of the coverings of the vesicle; the vesicle bursts, and its contents escape through the opening; they are received into the infundibulum, which is now applied firmly against the ovary; and the ovum entering the fallopian tube is conveyed along it, probably by its slow and gradual vermicular contractions, until it at last arrives at the uterus." Recent observations would lead us to

partly by the ciliary motions, which begin in the cervix uteri, partly by the contractions of the tubes, and partly by the motility of the spermatozoa."* Dr. Carpenter, however, seems to think the latter is the sole means! "That the spermatozoa make their way towards the ovarium, and fecundate the ovum either before it entirely quits the ovisac, or very shortly afterwards, appears to be the general rule in regard to mammalia; and the question naturally arises,—by what means do they arrive there? It has been supposed that the action of the cilia, which line the fallopian tubes, might account for their transit; but the direction of this is from the ovaria towards the uterus, and would therefore be opposed to it. A peristaltic action of the fallopian tubes themselves may generally be noticed in animals killed soon after sexual intercourse; and in those which have a two-horned membranous uterus, such as is evidently but a dilatation of the fallopian tube, this partakes of the same movement, as may be well seen in the rabbit; in animals, however, which have a single uterus with thicker walls (as in the human female), it must evidently be unavailable. Among the tribes whose ova are fertilized out of the body, the power of movement inherent in the spermatozoa is obviously the means by which they are brought into contact with the ova; and it does not seem unreasonable to suppose that the same is the case in regard to the higher classes: and that the transit of these curious particles from the vagina to the ovaries, is effected by the same kind of action as that which causes them to traverse the field of the microscope." *Human Physiol.* p. 595. — EDITOR.

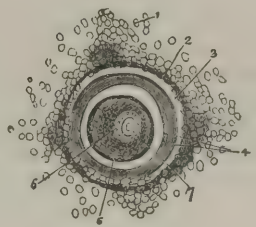
* Dunglison's Human Physiology, vol. ii. p. 372.

attribute some influence in this transmission, to the ciliary motions of the villi of the mucous membrane lining the tube.

146. It is scarcely possible to obtain an opportunity of examining the minute changes which take place in the Graafian vesicle in the human female; we must therefore avail ourselves of the information afforded by comparative physiology, and the more readily, as the process does not differ essentially. The following description is extracted from Dr. M. Barry's beautiful paper in the Phil. Trans. 1839, part ii. p. 350: — "Among the changes occurring in the ovum (of the rabbit) before it leaves the ovary, are the following: viz. the *germinal spot*, previously at the inner surface, passes to the centre of the *germinal vesicle;* the *germinal vesicle*, previously at the surface, passes to the centre of the *yelk;*

Fig. 39.

1. Tunica granulosa.
2. Chorion.
3. Zona pellucida.
4. Thick transparent membrane.
5. Yelk ball.
6. Germinal vesicle.
7. Germinal spot.



and the membrane investing the yelk, previously extremely thin, suddenly thickens." The *tunica granulosa* and *retinacula* are discharged with the ovum.

"Among the changes usually taking place in the ovum during its passage through the fallopian tube are the following: viz. 1. An outer membrane, the *chorion*, becomes visible; 2. The membrane originally investing the yelk, which had suddenly thickened, disappears by liquefaction; so that the yelk is now immediately surrounded by the thick transparent membrane (*zona pellucida*) of the ovarian ovum; 3. In the centre of the yelk there arise several very large and exceedingly transparent vesicles. These disappear, and are succeeded by a smaller and more numerous set. Several sets thus successively come into view, the vesicles of each succeeding set being more numerous and smaller than the last, until a mulberry-like structure has been produced, which occupies the centre of the ovum. Each of these vesicles contains a colourless and pellucid nucleus, and each nucleus presents a nucleolus."

"In the uterus, a layer of vesicles, of the same kind as those of the last and smallest here mentioned, makes its appearance on the whole of the inner surface of the membrane which now invests the yelk. The mulberry-like structure then passes from the centre of the yelk to a certain part of that layer, (the vesicles of the latter coalescing with those of the former, where the two sets are in contact, to form a membrane, the future amnion,) and the interior of the mulberry-like structure is now seen to be occupied by a large vesicle, containing a fluid and dark granules. In the centre of the fluid of this vesicle is a spherical body, composed of a substance having a finely granulous appearance, and containing a

cavity filled with a colourless and pellucid fluid. This hollow and spherical body seems to be the true germ. The vesicle containing it disappears, and in its place is seen an elliptical depression, filled with a pellucid fluid. In the centre of this depression is the germ, still presenting the appearance of a hollow sphere."

It is unnecessary to apologise for this minute account of the changes in the vesicle; the interest of the question, and the light thrown upon it by the able and careful researches of the distinguished physiologist from whom I have quoted, are more than sufficient reason for laying the results before my readers.

147. Let us now retrace our steps a little: during the increase of the vesicle in the ovary, "the inner coat becomes intensely vascular, and on its external surface, a soft gelatinous substance of a yellowish red colour, consisting apparently in part of blood and in part of lymph, is poured out between the two coats of the vesicle, in considerable quantity all around, except at the point where it is pressed toward the external surface of the ovary." Such is Dr. Montgomery's description of the formation of the *corpus luteum*, which he conceives aids in the expulsion of the ovum, after having served "as a sort of little temporary uterus" to the contained germ, "lined with a serous membrane, covered externally by another, and having interposed between them the fleshy or glandular structure of the corpus luteum, through which blood-vessels ramify, and exhale through the lining membrane a serous fluid for the support of the early ovum, which as yet lives only by imbibition." Professor Von Baer thought that the corpus luteum was the lining membrane of the vesicle in a state of hypertrophy, and Dr. R. Lee believes it to be a deposit external to the lining; but the extensive researches of Dr. Paterson, published in the fifty-third volume of the Edinburgh Journal, have, I conceive, decided the question in favour of Dr. Montgomery.

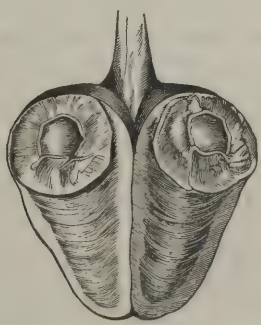
148. Shortly after the evolution of the ovum, the size of the ovary is found to be increased, especially at a certain part which is prominent, and about the size of a nut. At an early period after conception, this small tumour is of a bluish-red or purple colour, owing probably to the effusion of blood attendant on the rupture of its coats, and having numerous vessels filled with florid blood ramifying on its surface. In some part of this coloured surface of the tumour, a cicatrix, depression, or aperture, may be discovered, being the point at which the ovum escaped from the ovary into the fallopian tube.

149. These external appearances, however, are inadequate to prove the presence of a true corpus luteum; they require confirmation by the results of an internal examination. "Upon slitting open the ovarium at this part," says Dr. W. Hunter, "the corpus luteum appears a round body, of a very distinct nature from the rest of the ovarium. Sometimes it is oblong or oval, but more generally round. Its centre is white, with some degree of transparency; the rest of its substance has a yellowish cast, is very vascular, tender, and friable, like glandular flesh. Its larger vessels cling round its circumference, and then send their smaller branches inwards through its substance;" which substance, according to Dr. Allen Thompson, "has a lobular structure, the lobules radiating in a somewhat irregular manner from the centre to the circumference. The central part of the corpus luteum frequently remains hollow for some time after its

Fig. 40.

production, opening exteriorly by a narrow passage from the part where the rupture of the vesicle originally took place; at other times, this passage is closed more early, and there remains nothing but an indication of its place, in a depression in the centre of the most projecting part of the corpus luteum. The lobules of the corpus luteum, examined with the microscope, exhibit merely a granular structure, and are not formed of acini, as some have described them, so that there is no reason to consider them bodies of a glandular nature."

Fig. 41.



Corpus luteum, from Dr. Montgomery.

150. The following measurements of the ovaries and corpus luteum, at the third month of pregnancy, are given by Dr. Montgomery:

The unimpregnated ovary.		Ovary containing a corpus luteum.	
Length	1 inch 5 lines.	Length	1 inch 3 lines.
Breadth . . .	" $7\frac{1}{2}$ "	Breadth . . .	" 9 "
Thickness . . .	" $5\frac{1}{2}$ "	Thickness . . .	" $7\frac{1}{2}$ "

The corpus luteum, at the end of the third month, measured "in the longer axis, seven lines and a half; in the shorter, six lines and a half; in thickness, six and a half; and, measuring along the shorter axis, the glandular structure is, at the part deepest in the ovary, two lines and a

half thick, and at the outer part one line; the central cavity measures three lines in diameter."

151. For a short time after the escape of the ovum, the corpus luteum is said to increase in size, then to remain stationary, and afterwards to diminish slowly. After the third or fourth month the central cavity contracts, and its sides coming in contact give it the appearance of an irregular white line, somewhat radiated. After delivery, the corpus luteum shrinks, absorption takes place, and it disappears, though at what time is not quite certain. Dr. Montgomery has observed it five months after delivery; but Dr. Paterson's investigations would lead to the conclusion that it seldom remains so long.

152. The number of corpora lutea corresponds exactly to the number of children; as Dr. W. Hunter remarked, "where there is only one child, there is only one corpus luteum, and two in the case of twins." Meckel examined two hundred females of the class mammalia, and found this correspondence exact. But further, not only does each impregnated vesicle give rise to a corpus luteum, but nothing else does, at least in the human subject; so that the presence of a corpus luteum is a proof of impregnation.*

153. *Abnormal deviations.*—There are certain appearances in the ovary, called "*false corpora lutea*," which have been occasionally mistaken for true ones, but which may be distinguished by careful observation. False corpora lutea, according to Dr. Paterson, may arise, "1, from the bursting and subsequent filling with blood of a vesicle, as in menstruation (§ 109): 2, from partial effusion of blood into a vesicle, either with or without rupture of it: 3, by re-absorption of the fluid of a morbidly enlarged Graafian vesicle, giving rise to a puckered cyst: 4, from effusion of blood into the tissue of the ovary, the apoplexy of that organ: 5, tubercular deposits: 6, cysts filled with yellow fatty matter." In contradistinction to the true corpora lutea, as already described (§ 149), it is observed, that "they in general have an irregular form. They want the central cavity lined with a distinct membrane, or the central puckered cicatrix. They have no concentric radii. They are frequently numerous in both ovaries."†

* Dr. Carpenter says, "there is no correspondence between the number of corpora lutea found in the ovaries of a woman, or of cicatrices on their surface, and the number of children she may have borne. The number of corpora lutea must always be less, when there have been many conceptions; but the number of cicatrices may be greater; for several causes, such as the escape of unimpregnated ova, or the bursting of little abscesses, may give rise to such appearances." *Principles of Human Physiology*, 2d Am. Ed., p. 597.—EDITOR.

† "The true corpus luteum is further distinguished by its capability of being injected from the vessels of the ovary; which is not the case with tubercular deposits, or other substances which may simulate it." *Carpenter's Human Physiology*, Am. Ed., p. 596.

"M. Raciborski, from his experiments and dissections relative to the formation of the *corpora lutea*, draws the following conclusions:

"1. The *corpora lutea* are the result of a true hypertrophy of the granular layer which covers the internal membrane of the Graafian vesicles. The anatomical elements of these two parts are absolutely the same, only the granulations of the *corpora lutea* are much more numerous, and involve many more oily globules of a yellow colour.

"2. The transformation of the internal tunic into *corpus luteum* commences before the rupture of the vesicle, at the moment when it is ready to give passage to the ovule.

"3. As soon as the Graafian vesicles are ruptured, the transformation of the internal membrane into *corpus luteum* acquires an extraordinary activity. But there are here two essential differences remarked according as the expulsion of the ovule has been

CHAPTER IV.

UTERO-GESTATION.

154. Before proceeding to investigate the farther development of the ovum, let us examine the *changes which impregnation occasions in* the uterus, and which prepare it for the reception and nutrition of the fœtus.

Fig. 42.

spontaneous, as it occurs at each menstrual and rutting period, or according as it has been attended with sexual intercourse and conception.

"In the females of most of our domestic animals, as the pig, cow, sheep, &c., this difference does not exist. Whether these animals have or have not had connection with the males, the expulsion of the ovule is always followed by the formation of *corpora lutea*, represented by fleshy masses of a yellow or reddish colour. It is different, however, with women. If the expulsion of the ovule is not followed by conception, as happens at the ordinary menstrual period, then these granulations increase in size and number; but this activity of nutrition soon stops, and proceeds no further than the formation of a thin membrane of a more or less deep yellow colour, applied against the proper membrane of the vesicle; this membrane surrounds a cavity in which may generally be found traces of a clot of blood. If, on the other hand, conception coincides with the expulsion of the ovule, the elements of the granular tunic augment so in number and volume that in a short time they form a pretty voluminous mass, which of itself fills the whole cavity of the vesicle.

"4. In all women delivered at the full time, we find a *corpus luteum* such as we have described. But what is very remarkable, is the rapidity with which the *corpus luteum* decreases and becomes atrophied as soon as delivery takes place. Thus a *corpus luteum* which, on the second or third day after delivery, would have a medium diameter of seven-tenths of an inch, by the tenth day would be reduced more than one half, and, by the end of three months, a small scarcely-coloured particle, not exceeding a line in diameter, could alone be detected.

"5. It results from this, that in women it is very easy to distinguish, by the inspection alone, cases of the spontaneous expulsion of ova from those in which the expulsion has been followed by conception." *Edinburgh Med. and Surg. Journ., April*, 1845. *From Bulletin de l'Académie Royale de Médecine.*

"It is an important fact to notice, that, whereas a spurious corpus luteum comes to maturity in two or three days, the true corpus luteum goes on progressively increasing for some weeks. This assertion is based on the fact, that the walls of a false corpus luteum are thickest immediately after the cessation of the menstrua: whereas true corpora lutea, examined a month after the fœtal development has commenced, are found increasing." Dr. F. Renaud, *Monthly Journal of Med. Science*, August, 1845. — Editor.

It has already been stated, that conception is accompanied or immediately followed by congestion of the uterus; its *vessels* are filled with blood, and enlarge gradually, until they become of great size. Many which did not carry red blood before, and therefore were invisible, are now evident; and the whole form an intricate net-work on the surface and in the substance of the organ. Not only are the *arteries* (fig. 42) distended, but, to meet this increased labour imposed upon them, their coats are actually increased in thickness, so much so as to preclude their return to their former condition after the object of their temporary enlargement is fulfilled. This explains why we always find them more or less enlarged and tortuous, in women who have borne children.

The coats of the *veins* are much thinner, and admit of still greater distension; this is so marked in that part of the uterus to which the placenta is attached, that they have received the name of *uterine sinuses*.

The *lymphatics* undergo a proportionate development, and in the latter months of pregnancy may easily be traced. Mr. Cruikshank, I believe, has the credit of first demonstrating them.

155. The *nerves* of the uterus (fig. 43), which are very small in its unimpregnated state, increase in size, until at the full terms they form large cords, which send off numerous branches to accompany the uterine vessels, and which, anastomosing freely with each other, exhibit an appearance of network, similar to that observed in the vessels. Their substance is actually increased, nor do they recover their pristine size after delivery.

Fig. 43.

We are much indebted to the labours of Hunter, Tiedemann, and recently of Dr. Lee, for the additions they have made to our knowledge of the nerves of the uterus.

156. Great as these changes are, they are equalled, if not surpassed, by those which take place in the *proper tissue* of the uterus. In proportion as space is required for the fœtus, on account of its growth, the fibres are loosened, and separate from each other, leaving between them large interspaces, which afford space for, and are occupied by, the enlarging blood-vessels and nerves. The amount of distensibility is very great, and fully equal to the accommodation of the fœtus, during the term of intra-uterine life. Nor is this distension accompanied by much thinning of the parietes: according to Meckel, they increase in thickness during the first three months, and afterwards diminish to the end of gestation; but even then they are from one to two-thirds of an inch thick, and even more about the insertion of the placenta. To explain this, it is supposed that new matter is superadded during gestation, and removed after delivery; and this opinion is confirmed by the difference in weight between a virgin uterus and one at the full term, emptied of its contents; the former weighing one ounce, the latter about twenty-four. Even when deprived of its extra quantity of blood by firm contraction after delivery, it is many times larger than before conception.

157. The increase in the *size* of the womb commences at the fundus, immediately after the descent of the ovum, and, as this is developed, the body enlarges; last of all, and not before the fifth month, the cervix.

During the first four months, the entire organ is contained in the cavity of the pelvis; soon after which time the fundus may be felt, in thin females, above the symphysis pubis; about the fifth month it reaches midway between the pubes and umbilicus, and gives a roundness and fulness to the lower part of the abdomen; at the end of the sixth month, it is as high as the umbilicus, which it protrudes; during the seventh month, it ascends midway between the umbilicus and the ensiform cartilage; at the end of the eighth month, it reaches the ensiform cartilage and fills the abdomen, having the intestines above and behind it.

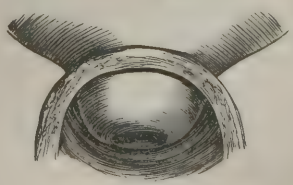
During the ninth month, although it somewhat increases in size, yet, from the yielding of the abdominal parietes, it does not ascend, but on the contrary is somewhat lower than previously. Its capacity is immensely increased; according to the calculations of Levret, its superficies may be estimated at 339 inches, and its cavity will contain 408 inches; its length being from 12 to 14 inches, its breadth from 9 to 10, and its depth, antero-posteriorly, from 8 to 9 inches.

158. A considerable change takes place in the cervix uteri; it becomes somewhat swollen, but soft, elastic, and cushion-like; the os uteri loses in some degree its defined form, and is dilatable; the canal through the

Fig. 44.

Cervix uteri at three months.

Fig. 45.

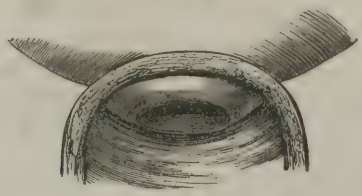


Cervix uteri at six months.

cervix, during the early months, is closed by the glutinous secretion of the follicles, and these glands are themselves enlarged, so as occasionally to be felt rolling under the finger.

During the first three months, the os uteri is lower than usual in the pelvis, owing to the increased weight of the uterus, and directed a little more forwards; as the uterus rises above the brim of the pelvis, it is directed backwards, and, after the fifth month, the cervix is drawn out by the expanding uterus and shortened. At the sixth month it is said to lose one-fourth of its length (fig. 45); at the seventh it is only half its original length; at the eighth it loses another quarter (fig. 46); and at the

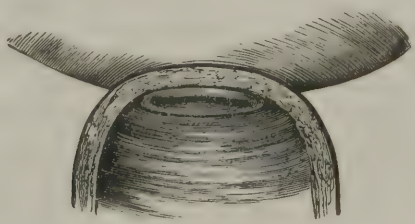
Fig. 46.



Cervix uteri at eight months.

ninth the neck is obliterated (fig. 47): so that upon making an examination, we find the vagina closed superiorly by the rounded lower end of the uterus, but no protruding cervix.

Fig. 47.



Cervix uteri at nine months.

159. The *figure* of the uterus at the full term is oviform (fig. 42), the larger end being uppermost, and rounder in proportion than the lower end. Some variations in shape are observed from the pressure of neighbouring parts, the position of the patient, or of the fœtus. Occasionally the uterus stretches unequally, so as to constitute true obliquity, one side being more developed than the other. Such cases are not common, nor do we know much of their effect upon labour; but I am told that the celebrated Tiedemann is about to publish a monograph on the subject, which I doubt not will throw light upon it.

The axis of the uterus, at the end of gestation, is commonly more perpendicular than that of the brim of the pelvis; but this want of agreement is rectified at the time of labour by the uterine contractions, which tilt the fundus forwards.

160. The *lining membrane* of the uterus participates in the general

congestion of the uterus at the time of conception. It becomes turgid with blood; its villi, according to Von Baer, elongate, and over and between them is spread a thin layer of pulpy semi-fluid matter, secreted by the mucous membrane: this is the *decidua* (fig. 48). It was noticed by

Fig. 48.

Burton, but described particularly by W. Hunter, and called after him the decidua of Hunter. The pulpy matter, after a short time, acquires consistence, and in its appearance and connection with the subjacent membrane resembles the coagulable lymph thrown off by mucous membranes in a state of disease. It lines the entire cavity of the uterus, closes it inferiorly, and, according to John Hunter and Breschet, sends off a short process into the fallopian tube, through which, they say, the ovum descends.

Dr. Sharpey, of London, whose microscopical researches are so well known, on investigating the membrana decidua of a bitch, came to the conclusion that it was not a secretion from the lining membrane of the uterus, but that membrane itself altered and modified.* This view has been confirmed by Bischoff. "Having had the opportunity of examining the uterus of a woman supposed to have been impregnated about three weeks before death, he was enabled to demonstrate quite satisfactorily that the membrana decidua in the human female, as in the bitch, is merely the ordinary mucous membrane of the uterus considerably developed, and that it consists essentially of enlarged uterine follicles and their blood-vessels, together with an unusually large quantity of secretion which these follicles have poured out. The internal surface of the uterus presented an appearance quite different from its ordinary one, being finely villous; and this was especially evident on placing it in water, or examining perpendicular sections of it. The surface itself, when looked upon from above, appeared as if perforated by a number of small apertures, or covered with numerous white points; and these, when examined by the microscope, are found to be the openings of cylindrical glandules. These glandules or follicles were from $1\frac{1}{2}$ to 2 Paris lines in length, were held together by a transparent material, and terminated each by a blind extremity which rested on the fibrous tissue of the uterus. They ran a somewhat wavy course, but never branched or anastomosed. Previous to

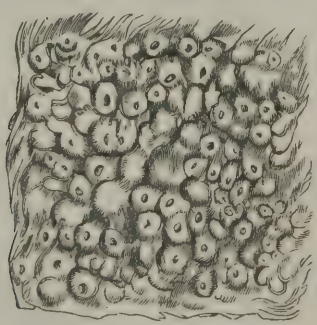
* Müller's Physiology by Baly, part iv., p. 1578.

impregnation, it seems to be exceedingly difficult to discover these glands in the mucous membrane of the uterus. Probably they then exist in a very undeveloped state, but immediately on the occurrence of conception increase rapidly, and exude an abundant secretion. Of these glands and their secretions (together with blood-vessels) the membrana decidua, and, later on, the placenta, essentially consist. The statement that a membrana decidua exists in the fallopian tube as well as in the uterus, in cases of fallopian impregnation, Bischoff combats, by observing that so far as has yet been seen, the lining membrane of the fallopian tube contains no glands by which the formation of a structure corresponding to an ordinary membrana decidua could be effected. A similar view to the above with regard to the membrana decidua has been advocated also by M. Cowiz, in the "Archives d'Anatomie Gen. et de Physiologie," for Sept. 1846.*

It is rough externally at an early period, and smooth internally, and so far resembles serous membranes, that it is a shut sac and contains a small quantity of fluid. Its colour is reddish or whitish gray. Its thickness varies in different places; it is thicker near the placenta, and thinner near the cervix uteri; it also becomes thinner after the third month, in proportion as pregnancy advances. It adheres but loosely to the mucous membrane at an early period, but firmly during the latter months, so much so that Von Baer states that it cannot be separated without bringing away the lining membrane also; this, however, is not always the case. The medium of its connection with the uterus is chiefly the small vessels which are supplied to it by that organ, and which are arranged in loops round its villi; they are very numerous near the placenta, but more scanty at the cervix.

161. A very important observation on the structure of the *decidua vera* has been made by Dr. Montgomery, in his valuable work on the "Signs of Pregnancy." "Repeated examinations," he remarks, "have shown

Fig. 49.



me that there are on the external surface of the decidua vera (fig. 49), a great number of small cup-like elevations, having the appearance of little bags, the bottoms of which are attached to, or imbedded in, its substance; they then expand or belly out a little, and again grow smaller towards

* Ranking's Abstract, vol. iv., p. 336.

their outer or uterine end, which in by far the greater number of them is an open mouth when separated from the uterus; how it may be while they are adherent, I cannot at present say. Some of them, which I have found more deeply imbedded in the decidua, were completely closed sacs. Their form is circular, or nearly so; they vary in diameter from the twelfth to the sixth of an inch, and project about the twelfth of an inch from the surface of the decidua." In a note Dr. Montgomery suggests that these "decidual cotyledons" serve "as reservoirs for nutrient fluids separated from the maternal blood, to be thence absorbed, for the support and development of the ovum."

162. When the ovum arrives at the uterine extremity of the fallopian tube, it must either push the membrana decidua before it, or pierce it, in order to enter the cavity of the uterus. Opinions have been much divided as to which of these two operations takes place; Dr. W. Hunter, Dr. R. Lee, and M. Breschet say that the ovum passes into the sac of the decidua; but Lobstein, Burdach, Velpeau, and, I believe, most recent writers, conceive that the sac remains entire, but that the ovum passes behind it to the situation where it fixes itself, and that its free surface (that part, I mean, which is not in contact with the uterus) is covered by the displaced decidua, to which the name of *decidua reflexa* has been given, to distinguish it from the *decidua vera*, and which was first observed by Dr. W. Hunter. As the ovum expands, so does the decidua reflexa, until at the end of gestation its inner surface is in contact with the inner surface of the decidua vera, just like (if I may be pardoned a very homely simile) the layers of a double night-cap when put on the bed. That space of the uterine parietes from which the decidua was detached by the ovum, increases with the enlargement of the uterus, and is occupied subsequently by the placenta; but between this organ and the uterus, a new layer of membrane — the *decidua serotina* — is deposited, resembling the decidua vera, to which it is united at the circumference of the placenta.

The decidua reflexa becomes thinner as pregnancy advances, and is ultimately expelled, more or less entire, with the fœtal membranes, whilst the decidua vera may remain for some time, and be then discharged in shreds with the lochia.

163. We know that the decidua is formed before the descent of the ovum, and therefore independent of it; and it is stated by most authorities that in cases of double uterus, both contain decidua, and, in extra-uterine fœtation, the uterus is lined by the decidua. There are, however, exceptions to the latter; for in the cases published by Dr. R. Lee, in the Med. Gazette, June 5, 1840, the decidua surrounded the ovum in the tube, and was not present in the uterus.

164. *Abnormal deviations.* — The decidua occasionally exhibits the effects of inflammation; it may be hypertrophied or increased in thickness by layers of adventitious membrane, and pus has been found on its surface. In its substance, calcareous depositions and spiculæ of bone may sometimes be detected. It may adhere firmly to the lining membrane of the uterus, and, persisting after delivery, may constitute the nucleus of a mole, &c.

165. We have seen that on leaving the ovary, the ovum is received into the fallopian tube; that its further transmission is effected by muscular motion and the ciliary movements of the villi of the mucous mem-

brane; and that there is reason to believe (judging from the ovum of the rabbit) that in its passage through the tube, an additional covering is developed.

It is difficult to determine the period (even if it be regular) at which the ovum arrives in the uterus. One thing appears certain; that several days elapse from the moment of impregnation. One of the earliest ova on record is that described by M. Velpeau (fig. 50, natural size; fig. 51, opened and magnified), which could not have been more than fourteen days old, unless the midwife who gave it to him, and who was herself the subject of the miscarriage, deceived him; and she appears to have had no reason for so doing.*

Fig. 50.

Fig. 51.

166. When the ovum arrives at the uterus, it consists of two membranes, the *chorion* and *amnion;* in the interspace between which is contained the *vesicula alba* or *umbilicalis*, and a *gelatinous substance*, the *tunica media* of Bischoff. Internal to the amnion, we find the *liquor amnii*, and the *embryo*. Each of these parts we shall now examine in detail.

167. The Chorion is the outer envelope proper to the ovum, and corresponds to the membrane lining the egg, in oviparous animals. It is found covering the ovum at the earliest period at which this has been seen in the uterus, surrounding it loosely, and forming a shut sac. It is smooth on its inner surface, but externally it is covered over with short cylindrical villi. As the ovum advances in age, these villi diminish in number, assume a vesicular appearance, and terminate in delicate rounded extremities. The interspaces are larger and more smooth. About the beginning of the second month the villi divide into branches, which arise from short thin stems, and terminate either in thin filiform or vesicular enlargements. The process of obliteration thus commenced, continues until no villi remain, except at that part of the chorion which is in contact with the uterus: the other part presenting the appearance of a thin, colourless, transparent membrane.

The umbilical cord is inserted into some part of the inner surface of the chorion; and that part of the outer surface which corresponds to this insertion, is that which always comes in contact with the uterine parietes, and upon which the placenta is formed.

The chorion may be divided into two laminæ, especially where it covers the placenta; the outer is called the *exochorion*, the inner the *endochorion*, by Burdach, who believed the latter to be the vascular layer of the allantois. From the endochorion, according to Bischoff, are derived the vessels which run to the villi. The chorion itself appears to be des-

* Dr. Allen Thompson has given an excellent notice of early ova observed by himself and others in the Edin. Med. and Surg. Journal, vol. iii., p. 119, to which I beg to refer the reader.

titute of vessels, unless, as Dr. W. Hunter suggested, we regard as such the white filaments observed near the edge of the placenta. The intimate structure of the membrane is cellular, and in many places bears a strong resemblance to that of vegetables, each cell containing a distinct nucleus: the villi participate in the same texture, but their cells are filled with a granular matter.

The strength of the membrane is greatest in early ova; at the termination of pregnancy it is considerably weaker than the amnion: at an early period it is equally strong in all parts, but afterwards it is stronger near the placenta. It is covered externally by the decidua reflexa, and internally it is separated from the amnion by a layer of gelatinous matter, which is afterwards condensed into a thin membrane called *tunica media* by Bischoff, who first described it.

168. *Abnormal deviations.* — Inflammation may attack the membrane, giving rise to vascularity, opacity, thickening, or the effusion of fluid between it and the amnion. Occasionally false membranes are deposited upon it, and the villi may be the seat of hydatids. Dr. Montgomery has a preparation in his museum, in which the cord is inserted into the part of the chorion covered by the decidua reflexa, instead of into that attached to the uterus. The fœtus of course perished for want of nourishment. Hemorrhage sometimes occurs into the space between the chorion and amnion.

169. I have already mentioned that during the first months of gestation, an albuminous or gelatinous mass of varying consistency is found between the chorion and amnion. It is often mixed with flocculi or threads, and occasionally presents a reticulated appearance. "When put into spirits," Wagner observes, "this mass assumes the appearance of the cellular tissue that is found between the muscles, and seems in fact to bear the same relation to the amnion and chorion, as the intermuscular cellular membrane does to the fasciculi between which it lies." The space it occupies is, in early ova, considerable; but it gradually diminishes as the two membranes approximate, and in proportion the interposed matter is condensed into an extremely delicate membrane like the arachnoid, termed by Bischoff and Wagner the *tunica media.* By Velpeau it is called the "*corps réticulaire*," and he considers it to be the allantois; but this opinion is rejected by other physiologists.

170. The Vesicula alba, or *umbilical vesicle* (fig. 54), is also contained in the interspace between the amnion and chorion. According to modern investigations, it is constantly present as a normal formation, in the earlier months of gestation, and is connected with the intestinal canal of the fœtus. It is in fact the vitellus surrounded by the blastoderma, upon which the embryo is first formed; and it bears a perfect analogy to the yelk of the egg, except that it is not ultimately enclosed within the abdomen of the fœtus. In very early ova, it is large in proportion, of a rounded or oval form, and lying upon the intestine, with which it communicates. In a short time, however, the inner end becomes narrow, and forms a pervious canal or duct through which its contents may be transmitted. M. Velpeau found it pervious in almost every ovum of six weeks old that he examined; and he states that he not only saw vitellary matter in the intestine, but that he could press the fluid from the vesicle through the duct into the intestine. The length of the duct varies in different

ova, and its calibre diminishes as gestation advances, until, in the second month, it is impervious and thread-like, but may still be traced to the loop of intestine contained in the sheath of the umbilical cord. The vesicle contains a yellowish-white or yelk-coloured fluid, in which numerous globules are suspended. Its parietes consist of two laminæ, an external vascular, and an internal mucous layer. It possesses two vessels, the omphalo-mesenteric artery and vein, which ramify upon its surface and on the duct. As gestation advances, the vesicle is emptied, shrinks and remains flat and collapsed to the termination of pregnancy.

Its *use* is evidently to contain nutriment for the fœtus, before the development of the placenta.

171. The Amnion (fig. 54).—In the quotation from Dr. Barry's paper (§ 146) descriptive of the changes which take place in the ovum after impregnation, it will be remembered, that the amnion was stated to be formed by the coalescing of the layer of small vesicles formed on the inner surface of the membrane which invests the yelk, with the "mulberry-like structure formed in the centre of the yelk, but passing to its circumference." M. Coste calls the amnion a "true epidermis of the blastoderma," and states that it is detached from the external surface of the embryonic spot. The membrane thus formed, envelopes the embryo very closely at an early period, and is continuous with the common integument of the fœtus, at the open abdominal parietes. At a later period it is distended with fluid, and so separated from the fœtus; and after being reflected upon the funis, of which it forms the outer coat, it terminates at the umbilicus. In the progress of gestation, the amnion approaches the chorion, until at last it is in contact with it, or rather with the tunica media. It is thin and transparent, but of a firm texture, resisting laceration much more than the other membranes. Its external surface is somewhat flocculent, but internally, it is quite smooth, like serous membrane, and, like it, it secretes a bland fluid. Neither vessels nor nerves can be demonstrated in the amnion in a state of health, though it may be presumed to possess them.

172. *Abnormal deviations.*—The researches of M. Mercier have established the fact that this membrane may be the seat of inflammation, and that in such cases it becomes vascular, and secretes a disproportionate quantity of fluid. It is not quite certain whether its quality is changed from diseased action. The membrane may also become thickened and opaque.

173. The Placenta.—Let us now consider the chorion at a more advanced period of gestation, and we shall find that a new organ has been developed on that part of it which is in contact with the uterus. This organ was first called the *placenta*, I believe, by Fallopius: it is a spongy vascular mass, existing in some form in all mammalia, as an appendage of the chorion. It is of considerable size at the termination of utero-gestation, its diameter being six or eight inches, its circumference eighteen or twenty-four, and its thickness from one inch to one and a half. In general it is of a rounded or oval form. Internally, its surface is smooth and shining, from its being covered by the chorion and amnion, beneath which the radiations of the umbilical vessels may be discovered. The chorion, which covers its inner surface immediately, is firmly attached to it, and sends processes between its lobes and lobules, whilst the amnion lying over the chorion is but loosely attached. The outer or uterine surface, if

Fig. 52.

the placenta be "*in situ*" or removed carefully, is uniform and level though not exactly smooth, being covered by the *decidua serotina;* if this be peeled off, the lobes and lobules into which the placenta is divided, are evident, and we find processes of the decidua serotina entering these divisions. The vessels of one lobe have very rarely any direct communication with those of another.

174. As to the *formation* of the placenta, we observed that the villi of the chorion diminish gradually in number, and finally disappear from every part of its surface, except where it is in contact with the uterus, at which part they become, as it were, concentrated, and grow with great luxuriance, in consequence of the development within them of vessels derived from the inner layer of the chorion (the endochorion), or from between the two layers. These vessels go on enlarging and multiplying, interlacing and anastomosing with each other, until they with their connecting (or separating) sheaths of villi or decidua serotina, form the mass of the placenta. The vessels are divided into arterial and venous branches. The two umbilical arteries at their insertion into the internal surface of the placenta, divide and subdivide into radiating branches, which plunging into its substance are minutely divided and distributed to the different lobes. It is generally stated that the ultimate radicles of the arteries terminate directly in the radicles of the umbilical vein, without the intervention of capillaries; but there is room for doubt upon this point. The radicles of the umbilical vein coalesce, until the large vessels formed by them unite in forming the umbilical vein, which is enclosed in the sheath of the funis umbilicalis with the arteries. The arteries are extremely tortuous, and the veins are without valves. It may be doubted whether the placenta is supplied with nerves, but it is pretty certain that it possesses lymphatics.*

175. The *situation* of the placenta may be ascertained with tolerable accuracy, by the use of the stethoscope before delivery, and the exami-

* "The formation of the placenta commences by the penetration of the ramified villi, or filamentous processes of the chorion, into the tubuli of the decidua; the villi thus serve as roots, which suck up and convey to the embryo the nourishment secreted for it by the maternal structures." (*Carpenter's Human Physiology*, p. 603.)—EDITOR.

nation of the perforation in the membranes afterwards. By some writers, it is stated to be at the fundus, or a little on one side of it: by others at the posterior or anterior surface: it would seem from the researches of M. Naegelè, jun. to be most frequently on the left side; next, on the right side of the uterus. He states that the stethoscope indicated the placenta to be attached to the left side, in two hundred and thirty-eight cases out of six hundred; and to the right side of the uterus, in one hundred and forty-one cases. In twenty no sound was perceptible; in one hundred and sixty it was weak, or diffused so as to be uncertain; in seven the placenta was attached to the fundus; in thirteen to the anterior wall; and in eleven cases there was placental presentation.

176. A much controverted question now demands our attention: viz. Whether there be direct vascular communication between the placenta and uterus? and if not, how is the aëration of the fœtal blood effected? I am afraid we cannot as yet decide the point in dispute. It was for a long time believed that the blood-vessels of the uterus and placenta communicated with each other, and that an interchange of blood took place, so that the fœtus obtained fresh blood from the mother for its own nutrition. This opinion was supported by Cowper, Noortwyk, Haller, Senac, and in modern times by Flourens.

177. The researches of the Monros, Hunters, Wrisberg, and others, however, very satisfactorily disproved the existence of this vascular continuity. The labours of the Hunters in particular threw great light upon the anatomical relations between the blood-vessels of the mother and fœtus. "They satisfied themselves," says Dr. J. Reid, in his paper in the Ed. Med. and Surg. Journal, No. cxlvi., "that the umbilical arteries terminate in the umbilical veins, and not in the vessels of the uterus," and that the blood in the umbilical arteries "passes from them into the veins, as in other parts of the body, and so back again into the child." They further observed, that numerous small curling arteries, the largest being about the size of a crow-quill, passed from the inner surface of the uterus, that they penetrated the decidua, and opened into the intestines between the fœtal blood-vessels of the placenta. Prolongations from the uterine sinuses were also traced through the decidua, and were observed to terminate in the placenta in the same manner as the curling arteries, so that "in the umbilical portion of the placenta, the arteries terminate in veins by a continuity of canal; whereas in the uterine portion, there are intermediate cells, in which the arteries terminate, and from which the veins begin. It was therefore concluded, that the blood of the mother was poured by the curling arteries into a kind of cellular tissue, filling up the intervals between the ramifications of the fœtal placental vessels, from which it returned to the uterine sinuses of the mother through their placental prolongations, after having acted upon the blood of the fœtus through the thin walls of the umbilical placental vessels."

178. On the other hand, Dr. Robert Lee concludes "that the placenta does not consist of two parts, maternal and fœtal, and that there is no communication between the uterus and placenta by large arteries and veins. The whole of the blood sent to the uterus by the spermatic and hypogastric arteries, except the small portion supplied to its parietes, and to the membrana decidua by the inner membrane of the uterus, flows into the uterine veins and sinuses, and after circulating through them, is re-

turned to the general circulation of the mother by the spermatic and hypogastric veins without entering the substance of the placenta. The deciduous membrane being interposed between the umbilical vessels and the uterus, whatever changes take place in the fœtal blood, must result from the indirect exposure of this fluid, as it circulates through the placenta, to the maternal blood in the great uterine sinuses." Lauth, Velpeau, Seiler, Coste, Radford, Ramsbotham, Millard, Noble, &c. agree with Dr. R. Lee in doubting the existence of these utero-placental vessels, and assume that the placenta is to be considered exclusively as the fœtal organ. Dutrochet's theory of endosmose and exosmose has been adduced to explain the nature and process of the interchange of blood, but I do not believe that it is considered satisfactory by many persons.

179. The investigations of Weber, Eschricht, Owen, and Reid, seem rather to carry us back to a modification of the opinions promulgated by the Hunters. According to Weber, the large vessels which leave the uterus to pass into the decidua, are deprived of all except their innermost tunics, which are as soft and tender as coagulated lymph. The veins form a network, and have this peculiarity, that they become wider, the more deeply they penetrate between the lobules. Thus the veins themselves form cells or sinuses into which the fœtal villi project. The delicate and yielding coat of the vein is borne inwards by each villus pressing upon its exterior, and so is itself the covering of all the villi which compose the fœtal lobules, and which seem to project into its interior. Eschricht supposes that the utero-placental vessels divide and subdivide in the placenta like the arteries and veins in the other parts of the body. Wagner, in his Physiology, agrees pretty nearly with Weber, and describes the utero-placental vessels as winding like a network around the tufts of the chorion containing the vessels of the embryo.

The last author to whom I shall refer is the late Dr. J. Reid, from whose essay I have already quoted, and whose industry and acumen obtained for him a distinguished place among the physiologists of the present day. In August, 1840, he carefully examined the uterus of a woman who had died in the seventh month of pregnancy. "On separating the adhering surfaces of the uterus slowly and cautiously under water, I satisfied myself, but not without considerable difficulty, of the existence of the utero-placental vessels described by the Hunters. After a portion of the placenta had been detached in this manner, my attention was attracted towards a number of rounded bands passing between the uterine surface of the placenta and the inner surface of the uterus. These bands were generally observed to become elongated, thinner, and of a cellular appearance when put upon the stretch, and were easily torn across; while at other times, though much more rarely, they could be drawn out in the form of tufts from the mouths of the uterine sinuses. On slitting up some of the uterine sinuses with the scissors, these tufts could be seen ramifying in their interior, and were more or less elongated; many of them appearing only to dip into the open mouths of the sinuses, while others proceeded from a quarter of an inch to an inch from the open mouths of the sinuses by which they had entered, and in some cases they extended themselves into one of the neighbouring sinuses." The parts were then injected as well as was possible, and when the branches of the tufts contained in the uterine sinuses were filled with injection,

"their continuity with the umbilical placental vessels was clearly ascertained;" and an examination with the microscope proved their identity with the umbilical vessels in the placenta. As to their anatomical relations to the sinuses: "these tufts were found to protrude into the open mouths of certain of the uterine sinuses only; and it need scarcely be added, that they were observed only in those sinuses placed next the inner surface of the uterus, and not in any of the deeper sinuses. These tufts were surrounded externally by a soft tube similar to the soft wall of the utero-placental vessels, which passed between the margin of the open mouths of the uterine sinuses and the edges of the orifices in the decidua, through which the tufts protruded themselves into the sinuses. The size of these tufts varied considerably. Some of them appeared to fill up completely the open mouths of the sinuses by which they entered, while others filled them only partially. On examining these tufts as they lay in the sinuses, it was evident that, though they were so far loose and could be floated about, yet they were bound down firmly at various points by reflections of the inner coat of the venous system of the mother upon their outer surface." "In this uterus we ascertained that while some of the utero-placental veins contained no prolongation of the fœtal-placental vessels, in others these passed along their interior and projected into the uterine sinuses. On tracing those utero-placental veins, which contained no fœtal vessels, as far as the placental surface of the decidua, the inner coat of the venous system was seen to be prolonged upon some of the tufts of fœtal-placental vessels in their immediate neighbourhood. On tracing one of the larger of the curling arteries through the decidua, it was also observed, that when it reached the placental surface of that membrane, the inner coat of the arterial system of the mother, was prolonged upon some of the tufts of the fœtal-placental vessels which projected into their orifices. Those numerous branches of the fœtal-placental vessels which reach the placental surface of the decidua, and do not pass into the uterine sinuses nor into the orifices of the utero-placental vessels, are attached by their apices to the placental surface of that membrane." After an elaborate description of the structure of the tufts and vessels of the placenta, Dr. Reid observes, "the interior of the placenta is thus composed of numerous trunks and branches (each including an artery and an accompanying vein), every one of which, we believe, is closely ensheathed in prolongations of the inner coat of the vascular system of the mother, or *at least in a membrane continuous with it*. If we adopt this view of the structure of the placenta, the inner coat of the vascular system of the mother is prolonged over each individual tuft, so that when the blood of the mother flows into the placenta through the curling arteries of the uterus, it passes into a large sac formed by the inner coat of the vascular system of the mother, which is intersected in many thousands of different directions, by the placental tufts projecting into it like fringes, and pushing its thin wall before them in the form of sheaths, which closely envelope both the trunk and each individual branch composing these tufts. From this sac the maternal blood is returned by the utero-placental veins, without having been extravasated, or without having left her own system of vessels." "The blood of the mother contained in this placental sac, and the blood of the fœtus contained in the umbilical vessels, can easily act and re-act upon each other through the spongy and cellular walls of

the placental vessels and the thin sac ensheathing them, in the same manner as the blood in the branchial vessels of aquatic animals is acted upon by the water in which they float." These ample quotations will, I believe, give the reader a just view of Dr. Reid's observations and opinions, and I may add that on a recent visit to Edinburgh, Dr. Reid had the kindness to show me one of the portions of uterus and placenta on which his investigations were made, and there was no difficulty in demonstrating the tufts dipping into the uterine sinuses. No doubt, further observations are necessary for the perfect elucidation of the subject; but I certainly think that as far as our knowledge extends it is in favour of the opinion adopted by Dr. Reid and the later physiologists.*

180. *Abnormal deviations.* — The placenta is liable to malformations and displacements, and to a series of diseases, some of which have been ably described by my friend Professor Simpson of Edinburgh.

1. It may be the seat of sudden or gradual congestion ending in resolution or in effusion of blood "into the substance of the organ, upon its uterine or fœtal surfaces, or between the membranes." Dr. Simpson suggests, that perhaps the so-called tumours, tubercles, or white spots, &c. of the placenta, of various authors, may in fact be coagula of blood in various stages of transformation. The symptoms to which placental congestion and apoplexy give rise, depend for their clear manifestation upon the extent of the hemorrhage. In moderate cases, there is a degree of uneasiness and weight in the region of the uterus, and sometimes a fixed or intermittent pain, which may extend down the thighs. When the hemorrhage is severe, it will be attended by the usual symptoms of loss of blood. The result to the fœtus in many cases is death, and thus the congestion may cause abortion.

2. Inflammation may attack the placenta, either of its parenchyma or membranes, or all together, and it may either affect one lobe only, or several at the same time.

* In the 154th No. of the Edinburgh Medical and Surgical Journal, we have the following very candid and honourable "statement" by Dr. Reid: "In a paper 'On the Anatomical Relations of the Blood-vessels of the Mother to those of the Fœtus in the Human Species,' printed in the 146th No. of this Journal, I have made a remark which I am anxious publicly to correct. It is mentioned in a foot-note, that I believe that the representation of the manner in which the fœtal placental vessels are distributed, as given by Wagner, in his Icones Physiologicæ, Fas. 1, Tab. xi. Fig. 2, and stated to have been furnished by Weber, is far from being correct. I had lately the satisfaction of visiting Weber, who not only very kindly showed me all his preparations, but gave me some portions of his beautifully injected placentæ. I am now perfectly satisfied that the representation he has given is perfectly correct. In calling in question the correctness of Weber's representation, I was at the time under the impression, from an examination of the engraving mentioned, — which, however, greater attention paid to Fig. 3 might have corrected, — that it was meant to imply, that the corresponding artery and vein did not run in the same sheath, but coiled about, sometimes apart from each other; for, being taken from a dried preparation, the sheath or villus in which they are enclosed is not represented, and it was this supposed error which alone led me to make the criticism mentioned above. I had not at this time seen Wagner's Lehrbuch der Physiologie, in which a detailed description of this structure is given. If I had supplied in fig. 2, by the aid of my imagination, the walls of the villus surrounding the convoluted artery, and its accompanying vein, I would not have questioned its accuracy, for I was maintaining, as the result of my own observations, that they were enclosed in the same sheath. I make this statement, not so much from the importance of the subject, for it relates merely to a minor question of anatomical detail; but having erroneously called in question, chiefly from a misapprehension on my part, the accuracy of an observation made by a most distinguished anatomist and most estimable man, I am anxious to correct it." *Edin. Med. and Surg. Journ.* No. cliv. p. 141. — Editor.

It may issue in the effusion of lymph either into its substance or upon its fœtal or uterine surfaces. In the former case we have the yellow induration of the placenta; in the latter, adhesions between the uterus and placenta; and, when the fœtal surface is the seat, there may be increase of the liquor amnii, lymph on its surface, or, possibly, adhesion to some part of the fœtus. Another termination of placentitis is in the production of purulent matter, in the substance or upon the surfaces of the placenta. The most constant symptom of placentitis, is pain in the uterine or lumbar regions, and in some cases there is violent vomiting; in others, rigors succeeded by febrile symptoms. Inflammation of the placenta may cause the death or malformation of the embryo, and place the mother in some danger. For more minute details I beg to refer the reader to Dr. Simpson's learned essay in the Ed. Med. and Surg. Journal, vol. xlv. p. 265.

3. The placenta may be hypertrophied or atrophied in part or the whole of its substance.

4. It may be the seat of cartilaginous or calcareous degeneration, or of other morbid products.

5. It may give rise to hydatids.

181. The Umbilical Cord, *funis or navel-string*, is the connecting link between the fœtus and placenta (fig. 52), terminating with the functions of the latter at birth. It is visible at the earliest period of pregnancy. It arises from the centre of the placenta most frequently, but occasionally from its edge (battledore placenta), and is formed by the umbilical arteries and vein, embedded in (the Whartonian) gelatine, and enclosed within a sheath of the chorion internally, and of the amnion externally. Besides the vessels, it contains the duct of the umbilical vesicle and the urachus, the omphalo-mesenteric vessels, and, at an early period, the fœtal intestines at its fœtal extremity. At first, the cord is thin and cylindrical, the vessels running a straight course through it; from the third to the ninth week, it appears to be divided by two or three vesicular swellings, which ultimately disappear. After this time, the vessels run in a spiral form, the arteries around the vein, from left to right, and form in their course a number of small loops or knots. The vein has no valves, and its calibre is equal to that of both the arteries. The cord is also supplied with lymphatics, as has been proved by the injections of Fohmann and Montgomery. It is probable, though not as yet demonstrated, that it may possess nerves also.

The length of the cord varies much; it is very rarely less than eight inches, though such cases are on record, and it is sometimes five or six feet long. Out of 500 cases, selected from the writings of Osiander, Adelmann, and Henne, with some additional measurements of my own, I find the most common length to be eighteen inches; none were under twelve, nor above fifty-four inches.*

By most writers, the pulsation of the artesia of the cord is considered

* "Mr. J. B. Thompson relates in the London Lancet, June 4, 1842, a case in which the funis was only seven and a half inches long. Mr. Stone has met with a case, in which the funis was still shorter, being only six inches; and Mr. Wm. Collyns, (Provincial Medical Journal, Aug. 6, 1842,) another, in which the funis was scarcely that length."—*Am. Journ. Med. Sciences*, Jan. 1843.

Dr. Tyler Smith exhibited to the Westminster Medical Society (Jan. 1850), a funis which measured fifty-nine inches and a half in length. — Editor.

to be dependent upon the heart; but Osiander contends that they are to a certain degree independent, and some facts which he adduces, appear to afford confirmation to his opinion.

After the birth of the child, the pulsation ceases in about fifteen or twenty minutes, and that portion of the cord which remains attached to the umbilicus dies, and gradually withers, until it falls off, in the majority of cases, on the fifth or sixth day.

In ordinary cases the funis lies free and loose in the cavity of the amnion, above the head of the child; but occasionally, owing to the movements of the child at an early period, it may be coiled round its neck, tied in knots, or escape below the head, so as to prolapse during labour. The coiling round the neck happens about once in nine or ten cases; or, according to the examples I have collected, 204 times in 1920 cases. It is commonly enumerated among the causes of delay in labour, on account of the shortening of the cord which it occasions, and sundry other evil effects are attributed to it, which I believe to be altogether imaginary, for the coiling does not occur except when the cord is longer than usual, so as to leave enough of it free. For more minute details I take the liberty to refer the reader to an essay on the subject in my Researches on Operative Midwifery, &c.

182. *Abnormal deviations.*—1. The vessels of the cord may divide at some distance from the placenta: 2, instead of two arteries and one vein, there have been found two veins and one artery, one vein and one artery, or three arteries: 3, two cords have been attached to one placenta with a single child: 4, the cord may be tied in double or single knots: 5, the vessels are sometimes partially or wholly closed: 6, cases are on record of the absence of funis and umbilicus: 7, in an acephalous fœtus born in the Western Lying-in Hospital we found the cord inserted into the neck, near the angle of the jaw, from whence the vessels passed down behind the clavicle and sternum, through the chest into the abdomen, where they were lost: 8, when the umbilical ring is imperfectly closed, the sheath of the cord sometimes contains a portion of the intestines: 9, in cases of twins, the placenta and cords are generally distinct and without communication, but occasionally a cross branch passes from one to the other: 10, the cord may be inserted into a part of the chorion, covered by the decidua reflexa, instead of that part upon which the placenta is to be developed: 11, the cord may be so much twisted (at an early period) as to diminish the calibre of the vessels, and to impair the nutrition of the embryo: 12, the vessels may become varicose, or the sheath of the cord may contain hydatids: 13, the coats of the vessels may give way, and hemorrhage ensue: 14, the cord may be torn across, by the mother's falling or receiving a violent concussion.

183. The Allantois "arises on the fore part of the posterior extremity of the mucous layer which is closing to form the intestine, as a growth of the intestine, which proceeds very rapidly. It passes out where the ventral laminæ are still unclosed, in the region of the umbilicus, and in birds and mammalia, reaches either mediately or immediately the inner surface of the exochorion. By the constriction of the navel it is separated into two portions which communicate; that within the body of the embryo is the sacculated urinary bladder with the urachus or tube of communication. It receives its vessels from the hypogastric, which are spread

out as a vascular layer, especially upon that portion of its surface which faces the exochorion. According to Burdach (as we have seen) the vessels form a distinct layer, the endochorion." I have preferred quoting this concise description from an article in the Brit. and For. Review, as giving a good account of the opinions held by most recent physiologists, to embarrassing the reader by a detail of the different hypotheses which have been broached on the subject.

184. The Liquor Amnii is the name given to the fluid secreted by the amnion and contained in its cavity. At first, it is small in quantity, clear and transparent; but afterwards it increases in quantity, and becomes slightly opaline. Dr. G. O. Rees has published, in No. 6 of Guy's Hospital Reports, an analysis of some amniotic fluid which he obtained in a case where premature labour was induced. He found its specific gravity 1008·6 and in 1000 parts, it contained

Of water	983·4
Of albumen, with traces of fatty matter . .	5·9
Albuminate of soda, chloride of sodium . .	6·1
Animal extractive, soluble in water and alcohol, urea, chloride of sodium	4·6

with traces of alkaline sulphate.

Towards the end of gestation the albumen diminishes.

The amount at the full time varies from half a pint to several quarts; but the average quantity is about a pound. The fluid is usually stated, and I believe truly, to be a secretion from the inner surface of the amnion: but Meckel attributes it to the maternal vessels, especially in the earlier months.

The *uses* of the liquor amnii are very intelligible and important: 1, it is probable that it serves for nutriment to the fœtus, at least during the early months: 2, it preserves an equable temperature for it, during its intra-uterine life: 3, it diminishes the impression from sudden movements, shocks, &c. and thereby prevents injury: 4, during labour it protrudes the membranes, and is the primary agent in dilating the os uteri.

185. *Abnormal deviations.*—It may be very scanty, or, in the opposite extreme, excessive. The latter deviation from its natural state is probably the result of inflammation, and occasions some mechanical inconveniences to the mother, and risk to the child during gestation, whilst at the time of labour, it seems to enfeeble the uterus during the first stage. The quality of the fluid may be changed, though it rarely decomposes. Its colour is sometimes yellow or brown.

186. The Embryo.—If the reader will take the trouble to turn back to § 146, he will find that in the quotation from Dr. Barry, the last change there described as occurring after impregnation, was the disappearance of the germ vesicle. When the vesicle bursts in the hen's egg, the formation of the *germ-membrane*, or *blastoderma*, commences, according to Purkinje, and it is completed by the fifth day, according to Von Baer. In mammalia, however, it appears to exist, previous to the bursting or disappearance of the vesicle; at least it is visible immediately the vitellus becomes transparent after that occurrence. Between this membrane and the chorion, there is a thin layer of albumen, and at some point we find an aggregation of granules, forming the cumulus of the blastoderma. It

is at this part that the embryo is developed, lying as it were upon the membrane. The form of the germinal membrane gradually changes, becoming more oval. It consists of three super-imposed laminæ or layers, at least at the central point or cumulus; and upon this separation into layers, rests the modern theory of development, as first proposed by Döllinger and Pander, and afterwards illustrated by Von Baer, Rathke, Burdach, &c., &c. "Above, and most extended," says the author of the very able article in the Brit. and For. Review, from whom I have already quoted, "is the *serous* layer; below and least extended is the *mucous;* between the two, and later in its appearance, is the *vascular* layer. In one or other of these, as distinct primitive forms, there lies concealed that which is essential, in the different organs and tissues of which the body is composed, and in virtue of which they admit of being referred to distinct original groups. On the serous layer, arise the organs of animal life—the brain and spinal cord, organs of sense, skin, muscle, tendons, ligaments, cartilage, bone; on the mucous, the organs of vegetative life, the intestinal canal, lungs, liver, spleen, pancreas, and other glands. The heart and vascular system arise from the vascular layer, if this is to be considered as a separate one. To which division the generative system is to be primarily referred, is still undetermined." This is the view generally accredited, but Dr. Barry seems to think it doubtful. He has not observed this "splitting of the germinal membrane," nor does he conceive that the membranous layers originate the embryo, but the reverse; that the "previously existing germ, by means of a hollow process, originates a structure having the appearance of a membrane."

In the centre of the blastoderma, where it is supposed to divide into the serous and mucous layers, there is observed a clear space, the *area proligera* or *pellucida*, in the centre of which and in the transverse axis of the vitellus, there is a mass of globules loosely connected together, forming the *primitive streak* or *trace* of Von Baer, and around this the *area vasculosa* is developed. I may mention that these changes have been observed in the ova of different mammalia, as well as in the egg; and there is every probability that the human ovum undergoes identical mutations.

The appearance of the primitive trace is observed in eggs at about the fourteenth hour of incubation, and in the human ovum may probably be referred to the second or third week.

To proceed with the next changes: "The globules of the primitive streak seem next to be resolved, and then there is a change of appearances. On the sides of the streak are two *laminæ dorsales*, which bound a median furrow; and below this furrow is the *chorda dorsalis*, which is the axis of the future embryo, and the origin of the spinal column. That portion of fluid which separates the chorda dorsalis from the lamina dorsalis is the future cord and brain. The chorda dorsalis thickens at the fore part, to form the first appearance of skull, and the fluid between the dorsal laminæ is in larger quantity, in correspondence with it; so that the central parts of the nervous system and their coverings are laid down at the same time, and grow simultaneously. The separation between the spinal cord and brain is a very early one, and is coincident with a bending downwards towards the yelk, of the anterior part of the laminæ dorsales, which defines the limit between the skull and column, brain and cord."

Next follows the closing of the laminæ dorsales over the fluid which is the rudiment of brain and cord. The brain, therefore, as Valentin remarks, ought not to be considered as growing from one end of the cord. "At first there is only a single cerebral vesicle; for in the brain, as well as in the cord, granules accumulate first on the periphery, the central part continuing to be fluid. The single vesicle is then elongated, and next appears constricted in certain regions, so as to form three cells, which communicate. The anterior cell corresponds to the cerebrum, the middle cell to the corpora quadrigemina and neighbouring parts, and the posterior cell to the medulla oblongata and neighbouring parts." "The deposit of granular matter which accompanies the further development of the brain and cord, is seen on that side of both which corresponds to the viscera, sooner than on that which corresponds to the spine."

"Two other laminæ (*laminæ ventrales* of Von Baer) are in the mean time proceeding from the axis of the embryo, one on each side. They grow out laterally, and tend to converge in the median line, as did the dorsal lamina; but they form a larger curve, and follow a different direction; that is, they converge to meet *below* the axis, and they do so meet, except in the umbilicus."

187. After the rudiments of organic life have been commenced in the central portion of the serous layer, a fold of its peripheral portion arches over the dorsal surface of the embryo, "so as to represent a sac whose opening is at the edge of the fold." The opening gradually decreases until the opposing folds of membrane are in contact, and then vanishes, leaving the fœtus surrounded by two membranes. The one next the fœtus is the *amnion;* the other is gradually separated from the amnion, and joins the serous laminæ of the blastoderma; this is the "false amnion," of Pander, or the "serous covering" of Von Baer. This mode of formation of the amnion, has been observed by Von Baer in the dog, sheep, and pig; and his observation has been verified by Dr. Allen Thompson.

The membrane which surrounds the vitellus or yelk is very vascular; it becomes oval in shape, and more pointed where it is in contact with the embryo, until at length it contracts into a narrow duct, thus forming the *vesicula alba* and *duct.*

The *allantois*, as already mentioned, arises from the lower end of the intestinal canal on a little vesicle, and increasing in size, encircles the embryo along with the umbilical vesicle.

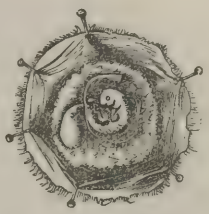
188. The heart of the embryo, which is the product of the vascular layer of the blastoderma, is formed at an early period; at first it appears as a twisted canal; at the under side it receives two omphalo-mesenteric veins, and in the situation of the future *bulbus aortæ* it divides into four vascular arches, which first uniting into the aorta, again divide, run down near the vertebral column, and give off the omphalo-mesenteric arteries, which ramify on the blastoderma and umbilical vesicle.

189. Thus, then, we have seen the embryo developed in the layers of the blastoderma, and formed by a gradual closing in of the laminæ towards the median line; thus the brain and spinal marrow, which are its earliest rudiments, are covered in, and in like manner the parts anterior to the spine, as the thorax, abdomen, &c. are formed. We are indebted to compative anatomy for opportunities of observation; but there is no doubt that the same process takes place in the human ovum. Professor

Wagner has given a description of a human ovum of about three weeks old, part of which I shall take the liberty of quoting: "Such ova, still surrounded by decidua, measure about seven lines in length; in the naked chorion, they are about five lines long. The chorion at this time, is beset

Fig. 53.

Fig. 54.



externally with small cylindrical hollow villi. The embryo itself is two lines long. It is plainly surrounded by an amnion which lies loosely, but still pretty closely about it, and obviously proceeds from the abdominal laminæ. The embryo is curved, and presents anterior cerebral vesicles or hemispheres, pretty well developed (figured rather large in figs. 53, 54,) and considerable corpora quadrigemina immediately behind them; there is the distinct appearance of an eye, and a rounded offset from the medulla oblongata, indicates the acoustic vesicle; several bronchial arteries and fissures are also conspicuous, the last of them, however, not completely formed. The oval aperture is just above the upper bronchial fissure. The anterior and posterior extremities are curved leaf-like processes, still of very small dimensions." The abdomen is yet an open cleft, in which, but projecting beyond it, is the heart, "of very large relative dimensions, and consisting of a simple atrium or auricle, and ventricle; behind the heart is the liver, and under the liver the intestine, which is attached by means of a distinct mesentery." Where the large and small intestines meet, the canal makes a sweep in the umbilical vesicle. On either side of the mesenteric lamina, we find the primordial kidney, composed of short cæca. The allantois is seen extending from the lower part of the intestine.

190. During the second month, we find the extremity larger and more projecting; the body curved, the head disproportionately large, and bent downwards, indications of the nostrils, and a gaping oral aperture. The abdomen is closed about the fifth week, except at the umbilical aperture, through which a loop of intestine still escapes. The os coccygis resembles a tail, bent forward, and of considerable size.

The forehead is more vaulted, because of the development of the hemispheres of the brain; the spinal cord is cylindrical, of nearly uniform thickness, and terminating in a blunt extremity; posteriorly it is open. "The medulla oblongata makes a bend forwards at the top of the neck, and then ascends perpendicularly into the capacious cranium, where the corpora quadrigemina present themselves, as two large semiglobular masses, having behind them a pair of narrow lateral laminæ, the rudiments of the cerebellum. The medullary stem or crus cerebri passes under the corpora quadrigemina, and again bending downwards, the corpora striata and optic thalami are evolved upon it."

The first points of ossification appear about the seventh week, in the clavicle and lower jaw; the vertebral arches are not yet closed in, and the ribs appear like little streaks. The only trace of muscular fibre is in

Fig. 55.

Fig. 56.

the diaphragm. The heart at this time begins to change its form, and the inter-ventricular septum to form. The liver is very large, and granular. The stomach is assuming somewhat of its normal form; the urinary bladder is enclosed, but the anus is imperforate.

After this period, the different parts are developed with tolerable rapidity; the separate portions of the brain are evolved, and the organs of sense acquire their external characters; the eyelids, nose, and ears are formed. About the seventh month, the membrana pupillaris is ruptured,

Fig. 57.

and the pupil becomes visible. The cranium continues cartilaginous for some time, then points of ossification are seen, which radiate until each bone is nearly complete.

The upper and lower extremities increase, the hands and feet are developed; the fingers and toes separate, and the nails become distinct about the sixth or seventh month.

In front of the coccyx we find the anus, which at first is imperforate; and anterior to it, the organs of generation, in form at first of a conical tubercle, which is subsequently developed into the penis or clitoris, while the skin at the sides is prolonged into the scrotum or labia. The testes are originally placed on each side of the vertebral column, but afterwards descend along the iliac vessels to the inguinal ring, through which they pass, carrying with them a portion of the peritoneum to form their tunica vaginalis.

The liver and kidneys are completed before the termination of pregnancy, and soon commence the performance of their functions; for the meconium is found to be coloured by the bile even in premature children, and urine is frequently voided during delivery.

[The formation of the ovum, and the development of the embryo, are among the most incomprehensible subjects to a student; at the risk, therefore, of some repetition of what is said upon these points by the author, I here introduce the following quotation, with the accompanying illustrations, from Dr. Rigby's work on Midwifery, in which the subjects are very clearly and concisely treated. — Editor.

"*Embryo.* — There is, perhaps, no department of physiology which has been so remarkably enriched by recent discoveries, as that which relates to the primitive development of the ovum and its embryo. The researches of Baer, Rathke, Purkinje, Valentin, &c., in Germany; of Dutrochet, Prevost, Dumas, and Coste, &c., in France; and of Owen, Sharpey, Allen Thompson, Jones, and Martin Barry in England, but more especially those of the celebrated Baer, have greatly advanced our knowledge of these subjects, and led us deeply into those mysterious processes of nature which relate to our first origin and formation.

"These researches have all tended to establish one great law, connected with the early development of the human embryo, and that of other mammiferous animals, viz., that it at first possesses a structure and arrangement analogous to that of animals in a much lower scale of formation; this observation also applies of course to the ovum itself, since a variety of changes take place in it after impregnation, before a trace of the embryo can be detected.

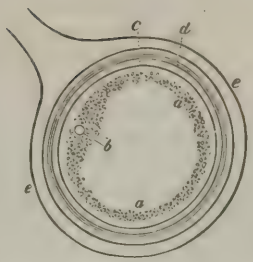
"At the earliest periods, the human ovum bears a perfect analogy to the eggs of fishes, amphibia, and birds: and it is only by carefully examining the changes produced by impregnation in the ova of these lower classes of animals, that we have been enabled to discover them in the mammalia and human subject.

"As the bird's egg, from its size, best affords us the means of investigating these changes, and as in all essential respects they are the same in the human ovum, it will be necessary for us to lay before our readers a short account of its structure and contents, and also of the changes which they undergo, after impregnation. In doing this we shall merely confine ourselves to the description of what is applicable to the human ovum.

"The egg is known to consist of two distinct parts, the vitellus or yelk surrounded by its albumen or white; to the former of these we now more

Fig. 58.

a. The granulary membrane forming the periphery of the yelk. *b.* Vesicle of Purkinje embedded in the cumulus. *c.* Vitellary membrane. *d.* Inner and outer layers of the capsule of the ovum. *e.* Indusium of the ovary.



Section of a hen's egg within the ovary.

particularly refer. The yelk is a granular albuminous fluid, contained in a granular membranous sac (the *blastodermic membrane*), which is covered by an investing membrane called the *vitelline membrane* or *yelk-bag*. The impregnated vitellus is retained in its capsule in the ovary precisely as the ovum of the mammifera is in the Graafian vesicle. The whole ovary in this case has a clustered appearance, like a bunch of grapes, each capsule being suspended by a short pedicle of indusium.

"In those ova which are considerably developed before impregnation, the granular blastodermic membrane is observed to be thicker, and the granules more aggregated at that part which corresponds to the pedicle, forming a slight elevation with a depression in its centre, like the cumulus in the proligerous disc of a Graafian vesicle. This little disc is the blastoderma, germinal membrane, or cicatricula; in the central depression

Fig. 59.

a. Vitelline membrane. *b.* Blastoderma. *From T. W. Jones.*

just mentioned is an exceedingly minute vesicle, first noticed by Professor Purkinje of Breslau, and named after him: in more correct language it is the *germinal vesicle.*

"According to Wagner, the germinal vesicle is not surrounded by a disc before impregnation; and it is only after this process that the above-mentioned disc of granules is formed. By the time the ovum is about to quit the ovary the vesicle itself has disappeared, so that an ovum has never been found in the oviduct containing a germinal vesicle, nothing remaining of it beyond the little depression in the cumulus of the cicatricula.

"The rupture of the Purkinjean or germinal vesicle has been supposed by Mr. T. W. Jones to take place before impregnation; but the observations of Professor Valentin seem to lead to the inference that it is a result of that process, and must be therefore looked upon as one of the earliest changes which take place in the ovum or yelk-bag upon quitting the ovary.*

* We said, "*one* of the earliest changes." Mr. Jones considers that "the breaking up of the surface of the yelk into crystalline forms," is the first change which he has observed.

"During its passing through the oviduct (what in mammalia is called the fallopian tube), the ovum receives a thick covering of albumen, and as it descends still farther along the canal the membrane of the shell is formed.

"On examining the appearance of the ovum in mammiferous animals, and especially the human ovum, it will be found that it presents a form and structure very analogous to the ova just described, more especially those of birds. It is a minute spherical sac, filled with an albuminous fluid, lined with its blastodermic or germinal membrane, in which is seated the germinal vesicle or vesicle of Purkinje. When the ovum has quitted the ovary the germinal vesicle disappears, and on its entering the fallopian tube it becomes covered with a gelatinous, or rather albuminous covering. This was inferred by Valentin, who considered that 'the enormous swelling of the ova, and their passage through the fallopian tubes,' tended to prove the circumstance. (*Edin. Med. and Surg. Journ.* April, 1836.) It has since been demonstrated by Mr. T. W. Jones in a rabbit seven days after impregnation. The vitellary membrane seems, at this time, to give way, leaving the vitellus of the ovum merely covered by its spherical blastoderma, and encased by the layer of albuminous matter which surrounds it.

"From what we have now stated, a close analogy will appear between the ova of the mammalia and those of the lower classes, more especially birds, which from their size afford us the best opportunities of investigating this difficult subject.

"In birds, the covering of the vitellus is called *yelk-bag;* whereas, in mammalia and man it receives the name of *vesicula umbilicalis*. Its albuminous covering, which corresponds to the white and membrane of the shell in birds, is called *chorion:* by the time that the ovum has reached the uterus, this outer membrane has undergone a considerable change; it becomes covered with a complete down of little absorbing fibrillæ, which rapidly increase in size as development advances, until it presents that tufted vascular appearance, which we have already mentioned when describing this membrane.

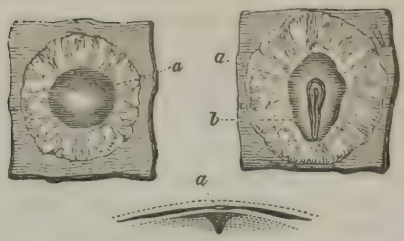
"The first or primitive trace of the embryo is in the cicatricula or germinal membrane, which contained the germinal vesicle before its disappearance. In the centre of this, upon its upper surface, may be discovered a small dark line:* 'this line or primitive trace is swollen at one extremity, and is placed in the direction of the transverse axis of the egg.'

"As development advances, the cicatricula expands. 'We are indebted to Pander,'† says Dr. Allen Thompson in his admirable essay above quoted, 'for the important discovery, that towards the twelfth or fourteenth hour, in the hen's egg the germinal membrane becomes divided into two layers of granules, the serous and mucous layers of the cicatricula; and that the rudimentary trace of the embryo, which has at this time become evident, is placed in the substance of the uppermost or serous layer.' 'According to this observer, and according to Baer, the part of this layer which surrounds the primitive trace soon becomes thicker;

* Allen Thompson on the Development of the Vascular System in the Fœtus of Vertebrated Animals. (*Edin. New Philosoph. Journ.* Oct. 1830.)

† Pander, Beiträge zur Entwickelungs-geschichte des Hünchens im Eie. Würzburg, 1817.

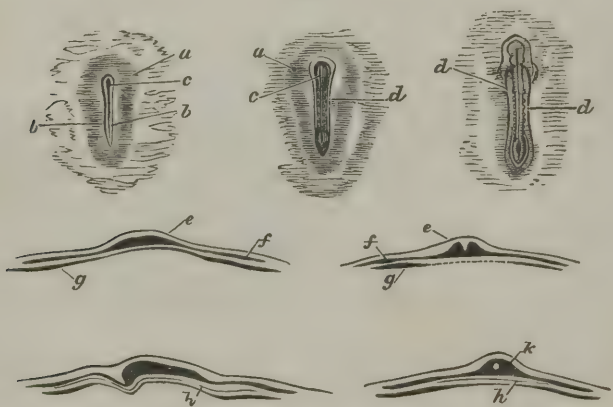
Fig. 60.



a. Transparent area.
b. Primitive trace.

and on examining this part with care, towards the eighteenth hour, we observe that a furrow has been formed in it, in the bottom of which the primitive trace is situated; about the twentieth hour this furrow is converted into a canal open at both ends, by the junction of its margins (the *plicæ primitivæ* of Pander, the *laminæ dorsales* of Baer): the canal soon becomes closed at the cephalic or swollen extremity of the primitive trace, at which part it is of a pyriform shape, being wider here than at any other

Fig. 61.

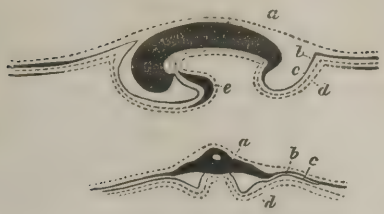


a. Transparent area. *b*. Laminæ dorsales. *c*. Cephalic end. *d*. Rudiments of dorsal vertebræ. *e*. Serous layer. *f*. Lateral portion of the primitive trace. *g*. Mucous layer. *h*. Vascular layer. *k*. Laminæ dorsales united to form the spinal canal.

part. According to Baer and Serres, some time after the canal begins to close, a semi-fluid matter is deposited in it, which on its acquiring greater consistence, becomes the rudiment of the spinal cord; the pyriform extremity or head is soon after this seen to be partially subdivided into three vesicles, which being also filled with a semi-fluid matter, gives rise to the rudimentary state of the encephalon.' 'As the formation of the spinal canal proceeds, the parts of the serous layer which surrounds it, especially towards the head, become thicker and more solid, and before the twenty-fourth hour we observe on each side of this canal four or five small round opaque bodies; these bodies indicate the first formation of the dorsal vertebræ.

"'About the same time, or from the twentieth to the twenty-fourth hour, the inner layer of the germinal membrane undergoes a farther division,

Fig. 62.



a. Serous layer.
b, *c*. Vascular layer.
d. Mucous layer.
e. Heart.

and by a peculiar change is converted into the vascular mucous layers.' (A. Thompson, *op. cit.*) It will thus be seen, that the germinal membrane is that part of the ovum in which the first changes produced by impregnation are observed. The rudiments of the osseous and nervous systems are formed by the outer or serous layers; the outer covering of the fœtus or integuments, including the amnios, are also furnished by it. 'The layer next in order has been called *vascular*, because in it the development of the principal parts of the vascular system appears to take place. The third, called the *mucous* layer, situated next the substance of the yelk, is generally in intimate connexion with the vascular layer, and it is to the changes which these combined layers undergo, that the intestinal, the respiratory, and probably also the glandular systems, owe their origin.' (A. Thompson, *op. cit.* p. 298.)

"The embryo is therefore formed in the layers of the germinal membrane, and becomes, as it were, spread out upon the surface of the ovum: the changes which the ovum of mammalia undergoes appear, from actual observation, to be precisely analogous to those in the inferior animals. (*Baer*, *Prevost*, and *Dumas*.) From the primitive trace, which was at first merely a line crossing the cicatricula, and which now begins rapidly to exhibit the characters of the spinal column, the parietes of the head and trunk gradually approach farther and farther towards the anterior surface of the abdomen and head until they unite; in this way the sides of the jaws close in the median line of the face, occasionally leaving the union incomplete, and thus appearing to produce in some cases the congenital defects of hair-lip and cleft palate. In some way the ribs meet at the sternum; and it may be supposed that sometimes this bone is left deficient, and thus may become one of the causes of those rare cases of malformation, where the child has been born with the heart external to the parietes of the thorax. In like manner the parietes of the abdomen and pelvis close in the linea alba and symphysis pubis, occasionally leaving the integuments of the navel deficient, or, in other words, producing congenital umbilical hernia, or at the pubes a non-union of its symphysis with a species of inversion of the bladder, the anterior wall of that viscus being nearly or entirely wanting.

"The cavity of the abdomen is therefore at first open to the vesicula umbilicalis or yelk, but this changes as the abdominal parietes begin to close in; in man and the mammalia merely a part of it, as above mentioned, forms the intestinal canal, whereas, in oviparous animals, the whole of the yelk-bag enters the abdominal cavity, and serves for an early nutriment to the young animal. Another change connected with the serous or outer layer of the germinal membrane is the formation of the *amnion*

The fœtal rudiment, which from its shape has been called *carina*, now begins to be enveloped by a membrane of exceeding tenuity, forming a double covering upon it; the one which immediately invests the fœtus is considered to form the future epidermis; the other, or outer fold, forms a loose sac around it, containing the liquor amnii. Whilst these changes are taking place in the serous layer of the germinal membrane, and whilst the intestinal canal, &c., are forming on the anterior surface of the embryo, which is turned towards the ovum, by means of the inner or mucous layer, equally important changes are now observed in the middle or vascular layer. 'In forming this fold,' says Dr. A. Thompson, 'the mucous layer is reflected farthest inwards; the serous layer advances least, and the space between them, occupied by the vascular layer, is filled up by a dilated part of this layer, the rudiment of the heart.' (*Op. cit.* p. 301.)

Fig. 63.

b. Is a portion of the convexity of the amnion, upon which at *a*, is the fundus of the diminutive human allantois.
c. The duct of the vesicula umbilicalis, dividing into two intestinal portions; and besides this duct are two vessels which are distributed upon the vesicula umbilicalis and form a reticular anastomosis with each other. — *From Baer.*

"Whilst this rudimentary trace of the vascular system is making its appearance, minute vessels are seen ramifying over the vesicula umbilicalis, forming, according to Baer's observations, a reticular anastomosis, which unites into two vessels the vasa omphalo-meseraica. (*British and Foreign Med. Rev.* No. 1.) These may be demonstrated with great ease in the chick: the cicatricula increases in extent; it becomes vascular, and at length forms a heart-shaped network of delicate vessels, which unite into two trunks, terminating one on each side of the abdomen.

"The umbilical vesicle now begins to separate itself more and more from the abdomen of the fœtus, merely a duct of communication passing to that portion of it which forms the intestinal canal. The first rudiment of the cord will be found at this separation; its fœtal extremity remains for a long time funnel-shaped, containing, besides a portion of intestine, the duct of the vesicula umbilicalis, the vasa omphalo-meseraica (the future vena portæ), the umbilical vein from the collected venous radicles of the chorion, and the early trace of the umbilical arteries. These last-named vessels ramify on a delicate membranous sac of an elongated form, which rises from the inferior or caudal extremity of the embryo, viz., the *allantois;* whether this is formed by a portion of the mucous layer of the germinal vesicle, in common with the other abdominal viscera, appears to be still uncertain: in birds this may be very easily demonstrated as a vascular vesicle arising from the extremity of the intestinal canal; and in mammalia, connected with the bladder by means of a canal called *urachus;* from its sausage-like shape, it has received the name of *allantois*.

"The existence of an allantois in the human embryo has been long inferred from the presence of a ligamentous cord extending from the fundus of the bladder to the umbilicus, like the urachus in animals. But from the extreme delicacy of the allantois, and from its function ceasing at a very early period, it had defied all research, until lately, when it has

been satisfactorily demonstrated in the human embryo by Baer and Rathke. It occupies the space between the chorion and amnion, and gives rise occasionally to a collection of fluid between these membranes, familiarly known by the name of the liquor amnii spurius, which, strictly speaking, is the liquor allantoidis.

"The function of the allantois is still in a great measure unknown. In animals it evidently acts as a species of receptaculum urinæ during the latter periods of gestation; but it is very doubtful if this be its use during the earlier periods. It does not seem directly connected with the process of nutrition, which at this time is proceeding so rapidly, first by means of the albuminous contents of the vitellus, or vesicula umbilicalis, and afterwards by the absorbing radicles of the chorion; but, from analogy with the structure of the lower classes of animals, it would appear that it is intended to produce certain changes in the rudimentary circulation of the embryo, similar to those which, at a later period of pregnancy, are effected by means of the placenta, and after birth, by the lungs, constituting the great functions of respiration.

"In many of the lower classes of animals, respiration (or at least the functions analogous to it) is performed by organs situated at the inferior or caudal extremity of the animal: thus, for instance, certain insect tribes, as in hymenoptera, or insects with a sting, as wasps, bees, &c.; in diptera, or insects with two wings, as the common fly; and also the spider tribe, have their respiratory organs situated in the lower part of the abdomen. In some of the crustacea, as, for instance, the shrimp, the organs of respiration lie under the tail between the fins, and floating loosely in the water. Again, some of the mollusca, viz., the cuttle-fish, have the respiratory organs in the abdomen. We also know that many animals, during the first periods of their lives, respire by a different set of organs to what they do in the adult state; the most familiar illustration of this is the frog, which, during its tadpole state, lives entirely in the water.

"As the growth of the embryo advances, other organs, whose function is as temporary as that of the allantois, make their appearance: these also correspond to the respiratory organs of a lower class of animals, although higher than those to which we have just alluded,—we mean branchial processes or gills. It is to Professor Rathke (*Acta Naturæ Curios.*, vol. xiv.), that we are indebted for pointing out the interesting fact, that several transverse slit-like apertures may be detected on each side of the neck of the embryo, at a very early stage of development. In the chick, in which he first observed it, it takes place about the fourth day of incubation: at this period the neck is remarkably thick, and contains a cavity which communicates inferiorly with the œsophagus and stomach, and opens externally on each side by means of the above-mentioned apertures, precisely as is observed in fishes, more especially the shark tribe; these apertures are separated from each other by lobular septa, of exceedingly soft and delicate structure. Rathke observed the same structure in the embryo of the pig and other mammalia; and Baer has since shown it distinctly in the human embryo. It is curious to see how the vascular system corresponds to the grade of development then present: the heart is single, consisting of one auricle and one ventricle; the aorta gives off four delicate, but perfectly simple branches, two of which go to the right, and two to the left side; each of these little arteries passes to one of the

lobules or septa at the side of the neck, which correspond to gills, and having again united with three others, close to what is the first rudiment of the vertebral column, they form a single trunk, which afterwards becomes the abdominal aorta. In a short time these slit-like openings begin

Fig. 64.

a. Branchial processes. *b*. Vesicula umbilicalis. *c*. Vitellus. *d*. Allantois. *e*. Amnion. *From Baer.*

to close; the branchial processes or septa become obliterated, and indistinguishable from the adjacent parts; the heart loses the form of a single heart; a crescentic fold begins to mark the future division into two ventricles, and gradually extends until the septum between them is completed. It is also continued along the bulb of the aorta, dividing it into two trunks, the aorta proper and pulmonary artery; at the upper part the division is left incomplete, so that there is an opening from one vessel to the other, which forms the ductus arteriosus.* A similar process takes place in the auricles, the foramen ovale being apparently formed in the same manner as the ductus arteriosus; these changes commence in the human embryo about the fourth week, and are completed about the seventh.

"At first the body of the embryo has a more elongated form than afterwards, and the part which is first developed is the trunk, at the upper extremity of which a small prominence, less thick than the middle part, and separated from the rest of the body by an indentation, distinguishes the head. There are as yet no traces whatever of extremities, or of any other prominent parts; it is straight, or nearly so, the posterior surface slightly convex, the anterior slightly concave, and rests with its inferior extremity directly upon the membranes, or by means of an extremely short umbilical cord.

"The head now increases considerably in proportion to the rest of the body; so much so, that at the beginning of the second month, it equals nearly half the size of the whole body: previous to, and after this period, it is usually smaller. The body of the embryo becomes considerably curved, both at its upper as well as its lower extremity, although the trunk itself still continues straight. The head joins the body at a right angle, so that the part of it which corresponds to the chin is fixed directly upon the upper part of the breast; nor can any traces of neck be discerned, until nearly the end of the second month.

"The inferior extremity of the vertical column, which at first resembles the rudiment of a tail, becomes shorter towards the middle of the third month, and takes a curvature forwards under the rectum. In the fifth

* In making these observations upon the formation of the ductus arteriosus, we must request our readers to consider this as still an unsettled question.

week the extremities become visible, the upper usually somewhat sooner than the lower, in the form of small blunt prominences,—the upper close under the head, the lower near the caudal extremity of the vertebral column. Both are turned somewhat outwards, on account of the size of the abdomen; the upper are usually directed somewhat downwards, the lower ones somewhat upwards.

"The vesicula umbilicalis may still be distinguished in the second month as a small vesicle, not larger than a pea, near the insertion of the cord, at the navel, and external to the amnion. From the trunk, which is almost entirely occupied by the abdominal cavity, arises a short, thick umbilical cord, in which some of the convolutions of the intestines may still be traced. Besides these, it usually contains, as already observed, the

Fig. 65.

Diagram of the fœtus and membranes about the fourth week.

a. Vesicula umbilicalis, already passing into the ventricular and rectum intestine at *g*. *b*. Vena and arteria omphalo-meseraica. *c*. Allantois springing from the pelvis with the umbilical arteries. *d*. Embryo. *e*. Amnion. *f*. Chorion. *From Carus*.

two umbilical arteries and the umbilical vein, the urachus, the vasa omphalo-meseraica, or vein and artery of the vesicula umbilicalis, and perhaps, even at this period, the duct of communication between the intestinal canal and vesicula umbilicalis, the fœtal extremity of which, according to Professor Oken's views, forms the processus vermiformis.

"The hands seem to be fixed to the shoulders without arms, and the

Fig. 66.

Diagram of the fœtus and membranes about the sixth week.

a. Chorion. *b*. The larger absorbent extremities, the site of the placenta. *c*. Allantois. *d*. Amnion. *e*. Urachus. *é*. Bladder. *f*. Vesicula umbilicalis. *g*. Communicating canal between the vesicula umbilicalis and intestine. *h*. Vena umbilicalis. *i*, *i*. Arteriæ umbilicales. *l*. Vena omphalo-meseraica. *k*. Arteria omphalo-meseraica. *n*. Heart. *o*. Rudiment of superior extremity. *p*. Rudiment of lower extremity. *From Carus*.

feet to adhere to the ossa ilii; the liver seems to fill the whole abdomen; the ossa innominata, the ribs, and scapulæ, are cartilaginous.

"In a short time the little stump-like prominences of the extremities become longer, and are now divided into two parts, the superior into the hand and the fore-arm, the inferior into the foot and leg; in one or two weeks later, the arms and thighs are visible. These parts of the extremities which are formed later than the others, are at first smaller, but as they are gradually developed they become larger. When the limbs begin to separate into an upper and lower part, their extremities become rounder and broader, and divided into the fingers and toes, which at first are disproportionately thick, and until the end of the third month are connected by a membranous substance analogous to the webbed feet of water-birds; this membrane gradually disappears, beginning at the extremities of the fingers and toes, and continuing the division up to their insertion. The external parts of generation, the nose, ears, and mouth, appear after the development of the extremities. The insertion of the umbilical cord changes its situation to a certain degree; instead of being nearly at the inferior extremity of the fœtus, as at first, it is now situated higher up, on the anterior surface of the abdomen. The comparative distance between the umbilicus and pubis continues to increase, not only to the full period of gestation, when it occupies the middle point of the length of the child's body, as pointed out by Chaussier, but even to the age of puberty, from the relative size of the liver becoming smaller.

"Though the head appears large at first, and for a long time continues so, yet its contents are tardy in their development, and until the sixth month the parietes of the skull are in great measure membranous or cartilaginous. Ossification commences in the base of the cranium, and the bones under the scalp are those in which this process is last completed.

"The contents of the skull are at first gelatinous, and no distinct traces of the natural structure of the brain can be identified until the close of the second month; even then it requires to have been some time previously immersed in alcohol to harden its texture. There are many parts of it not properly developed until the seventh month. In the medulla spinalis no fibres can be distinguished until the fourth month. The thalami nervorem opticorum, the corpora striata, and tubercula quadrigemina, are seen in the second month; in the third, the lateral and longitudinal sinuses can be traced, and contain blood. In the fifth we can distinguish the corpus callosum; but the cerebral mass has yet acquired very little solidity, for until the sixth month it is almost semi-fluid. (Campbell's *System of Midwifery*.)

"About the end of the third, during the fourth, and the beginning of the fifth months, the mother begins to be sensible of the movements of the fœtus. These motions are felt sooner or later, according to the bulk of the child, the size and shape of the pelvis, and the quantity of fluid contained in the amnion; the waters being in larger proportionate quantity the younger the fœtus.

"The secretion of bile, like that of the fat, seems to begin towards the middle of pregnancy, and tinges the meconium, a mucous secretion of the intestinal tube, which had hitherto been colourless, of a yellow colour. Shortly after this the hair begins to grow, and the nails are formed about the sixth or seventh month. A very delicate membrane (membrana pu-

pillaris), by which the pupil has been hitherto closed, now ruptures, and the pupil becomes visible. The kidneys, which at first were composed of numerous glandular lobules (seventeen or eighteen in number), now unite, and form a separate viscus on each side of the spine; sometimes they unite into one large mass, an intermediate portion extending across the spine, forming the horse-shoe kidney.

"Lastly, the testes, which at first were placed on each side of the lumbar vertebræ, near the origin of the spermatic vessels, now descend along the iliac vessels towards the inguinal rings, directed by a cellular cord, which Hunter has called *Gubernaculum testis:* they then pass through the openings, carrying before them that portion of the peritoneum which is to form their tunica vaginalis.

"The length of a full-grown fœtus is generally about eighteen or nineteen inches; its weight between six and seven pounds. The different parts are well developed and rounded; the body is generally covered with the vernix caseosa;* the nails are horny, and project beyond the tips of the fingers, which is not the case with the toes; the head has attained its proper size and hardness; the ears have the firmness of cartilage; the scrotum is rugous, not peculiarly red, and usually containing the testes. In female children, the nymphæ are generally covered entirely by the labia, the breasts project, and in both sexes frequently contain a milky fluid. As soon as a child is born, which has been carried the full time, it usually cries loudly, opens its eyes, and moves its arms and legs briskly; it soon passes urine and fæces, and greedily takes the nipple. (Naegelè's *Hebammenbuch.*)

"Thus then, in the space of forty weeks, or ten lunar months, from an inappreciable point, the fœtus attains a medium length of about eighteen or nineteen inches, and a medium weight of between six and seven pounds."]

191. It was formerly asserted that the *position of the child* in utero during the early months was sedentary, facing anteriorly; and that towards the end of gestation, owing to the greater weight of the head, and to its voluntary efforts, it made a revolution, so as to present with the head. This, however, is not the case. With some exceptions, the position of the child is unaltered from an early period of pregnancy to its termination, whether the head be upwards or downwards. The arms are generally folded over the chest, the knees drawn up to the abdomen, the back curved, and the head bent upon the chest so as to occupy as little space as possible. In ordinary cases, the face and anterior surface of the child, neither look forward as was formerly supposed, nor in the direction of the transverse diameter of the pelvis, as is sometimes stated, but obliquely, so that in the first and second *position* the *back* of the fœtus is turned partly forwards, and the *chest* in the third and fourth. This point having been established by observation, we are enabled in many cases to

* The vernix caseosa is a viscid fatty matter, of a yellowish white colour, adhering to different parts of the child's body, and in some cases in such quantity as to cover the whole surface; it seems to be a substance intermediate between fibrine and fat, having a considerable resemblance to spermaceti. From the known activity of the sebaceous glands in the fœtal state, and from the smegma being found in the greatest quantity about the head, arm-pits, and groins, where these glands are most abundant, there is every reason to consider it as the secretion of the sebaceous glands of the skin during the latter months of pregnancy.

ascertain the position of the infant before labour has commenced, by means of the stethoscope, according as the pulsation is heard at one side or other of the abdomen, and more or less clearly.

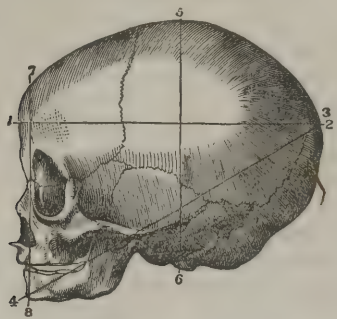
Fig. 67.

192. Various *causes* of the position of the fœtus in utero have been mentioned, such as gravitation, voluntary movements, &c. Professor Simpson has entered into an elaborate investigation of the subject, and has arrived at the following conclusions:—"1. The usual position of the fœtus, with the head lowest and presenting over the os uteri, is not assumed till about the sixth month of intra-uterine life, and becomes more frequent and more certain from that time onwards to the full term of utero-gestation. 2. Both the assumption and maintenance of this position are vital and not physical acts, for they are found dependent on the existence and continuance of vitality in the child; concurring with its life, but being lost by its death. 3. In human physiology we do not know or recognize any vital power or action, except muscular action, capable of producing motions calculated to alter or regulate the position, either of the whole body or of any of its parts; and further, the motory muscular actions of the fœtus are not spontaneous or voluntary, but reflex or excito-motory in their nature, causation, and effects. 4. The position of the fœtus with the head placed over the os uteri, is that position in which the physical shape of the normal and fully-developed fœtus is best adapted to the physical shape of the normal and fully-developed cavity of the uterus. 5. This adaptive position of the contained body to the containing cavity is the aggregate result of reflex or excito-motory movements on the part of the fœtus, by which it keeps its cutaneous surface withdrawn as far as possible from the causes of irritation that may act upon it as excitants, or that happen to restrain its freedom of position or of motion."

193. The length of a full-grown fœtus is from 18 to 22 or 24 inches.

The longitudinal diameter of its head (1 2) is from	4 to 4½ "
The transverse	3½ to 4 "
The occipito-mental or oblique (3 4) . .	5 "
The cervico-bregmatic (5 6)	4 to 4½ "
The trachelo-bregmatic	3½ to 4 "
The inter-auricular	3 "
The fronto-mental (7 8)	3½ "
The transverse diameter of the shoulders .	4¾ to 5½ "
The transverse diameter of the hips . .	4 to 5 "

Fig. 68.



In general, it may be observed that all the measurements are less in female than in male children.*

The weight of a full-grown child at birth varies in the same and in different sexes. Rœderer found the weight in Germany, to be from seven to eight pounds. Dr. Jno. Clarke, in the Lying-in Hospital, Dublin, ascertained the weight of the majority, to be about seven pounds, but that it varied from four to eleven pounds. In France, the average weight is less; according to Camus, it is six pounds and a quarter, and observations at La Maternité have confirmed this estimate. In Brussels, it is six pounds and a half; but in Moscow, nine pounds and one fifteenth. Dr. Beck states that the average weight in America exceeds seven pounds.†

194. The umbilicus changes its relative position as the development of the fœtus proceeds, until at birth, it is near the middle of the entire length

* Dr. Meigs (Obstetrics; the Science and the Art, p. 63) makes the occipito-frontal diameter four inches and ten-twelfths of an inch. "I speak," he remarks, "with great confidence as to the above estimate, for I have carefully measured and recorded the size of three hundred crania of mature children that I received in the course of my obstetric practice."

The bi-parietal diameter, being the mean derived from the measurement of one hundred and fifty crania, he makes three inches and eleven-twelfths of an inch.

The occipito-mental diameter, being the mean derived from the measurement of one hundred and twenty-six crania, he makes five inches and a half. — Editor.

† The variations in weight are surprisingly great in all countries; and it is highly probable that the *average* in this respect, if it could be correctly ascertained, would not be found to differ in different countries so much as is stated above. In the United States, it is not customary in private practice either to measure or weigh the infant at the time of birth, except when the size is unusual; hence all general statements of the kind are derived from alms-houses and hospitals, which can hardly be considered to represent fairly what obtains among the mass of the people. — Editor.

of the child. According to Chaussier, Bigeschi, and others, this relative position of the umbilicus is a test of its maturity, being distant from the central point in proportion to its immaturity. But it seems doubtful whether its position is so exactly central in mature children as these authors state; for M. Moreau has recently measured five hundred children, born at the full term in La Maternité, Paris, and of this number, he found only four in whom the umbilicus was exactly central. In the remainder, the point of insertion of the funis fell on an average from eight to ten lines below the middle. In a few children born about the sixth or eighth month, the umbilicus was central.

195. The *characteristics of the maturity and perfection* of a child at birth, according to Foderè and Capuron are, its ability to cry as soon as it reaches the atmospheric air, or shortly after; to move its limbs with facility and more or less strength, its body being of a clear red colour; the mouth, nostrils, eyelids, and ears, perfectly open; the bones of the cranium possessing some solidity, and the edges of the fontanelles not far apart; the hair, eyebrows, and nails, perfectly developed; the free discharge of the meconium a few hours after birth, and finally, the power of swallowing and digesting, indicated by its seizing the nipple or finger placed within its mouth.

The child may be considered *immature*, when its length and volume are much less than those of an infant at the full term; when it does not move its limbs, or makes only feeble motions; when it seems unable to suck, and has to be fed artificially; when its skin is of an intense red colour, and traversed by numerous bluish vessels; when the head is covered with down, and the nails are not formed; when the bones of the head are soft, and the fontanelles widely separated; the eyelids, mouth, and nostrils closed; when it sleeps continually, and an artificial heat is necessary to preserve it; and when it discharges its urine and meconium imperfectly.

There are cases on record of children prematurely born at the fifth and sixth month of gestation, attaining maturity; but ordinarily we do not consider a child '*viable*' until about the seventh month of utero-gestation.

196. The *proportion of the sexes* in Europe, according to the learned M. Quetelet, is about 106 males to 100 females, nor does it appear that in this part of the world, climate has much influence. At the Cape of Good Hope, female births predominate among the free inhabitants, and the opposite among the slaves. A country life seems to favour the production of male progeny; and the relative ages of husband and wife exert a decided influence, for in proportion as the husband is younger than the wife, girls predominate, and within certain limits, a disproportion the other way has the opposite effects; or as Mr. Sadler has expressed it, upon a mean number of births, the sex of the child is that of the parent whose age is in excess.*

* Dr. G. Emerson, of Philadelphia, has carefully investigated the influences operating to change the number of births, and also the relative proportion of the sexes at birth; he includes them under two heads:—

1st. The Seasons.—The following general results relative to this point were obtained from estimates based upon 65,542 births in Philadelphia. The greatest number of conceptions occurred during the winter and spring months; the maximum being 17,645 in the spring months. The smallest number occurred in the summer and autumn months, the minimum being 15,200 in the summer quarter.

The number of twin cases at La Maternité was 444 in 37,441 cases, or 1 in 84; in the Dublin Lying-in Hospital 2101 cases in 134,908, or about 1 in 64; in the same number 29 triplet cases occurred, or 1 in 4652; and one case of quadruplets.

The mean proportion of still-born children in the cities of Europe is about 1 in 22 births: the extreme variation is from 1 in 11 at Strasburg, to 1 in 36 at Stockholm.

In the Lying-in Hospital in this city from its establishment in 1757 to 1836 there occurred 8021 still-born children in 134,908 cases, or about 1 in 17.

The number of still-born males is greater than that of females: in West Flanders and at Berlin in the proportion of 14 to 10.

197. The Physiology of Fœtal life is simply that of organic nutrition; at first by superficial imbibition, afterwards probably by absorption by the villi of the chorion, and ultimately by the changes made in or additions to the fœtal blood, in the placenta.

The sources of nutriment during the earliest period of embryonic life are the vitellus, or the fluid in the umbilical vesicle, and possibly the gelatinous matter (tunica media) between the amnion and chorion. After the formation of the amnion, its fluid may possibly contribute to this end. Dr. Montgomery, as we have seen, suggests that the milky fluid contained in the decidual cotyledons, may also be available for this purpose.

There is no doubt of the functions of the placenta: there the blood of the fœtus is renovated from that of the mother, in the same way as the blood of fishes is aërated by the water passing through the gills.

Whether in the earlier months absorption is carried on by the surface alone, or whether, as Velpeau suggests, a portion of the liquor amnii finds its way into the stomach, may be difficult to decide, but that a certain amount of digestion is carried on, is impossible to doubt.*

The greatest excess of male conceptions is shown to be in the winter season, when, the total being 17,184, the males were 9,007, and the females 8,177. The excess of male conceptions for the other three quarters or seasons, varies but little from the minimum excess, which occurs in spring.

2d. The plenty or deficiencies of food, purity or impurity of the air, over-working, and whatever tends to exalt or to impair the vital energies of the people. In many parts of Europe, where the general population is over-worked and *under-fed*, the excess of male births is very small; being throughout France and Prussia under 6 per cent., and in England about 5 per cent. In Philadelphia, where the general condition of the population is very favourable, the male births exceed the female about 7 per cent. In the rural districts of the United States, and especially in the newest settlements, the preponderance of boys at birth is believed to be not less than 10 per cent. An opposite result is found when fatal epidemics alarm and depress the public mind. Thus, among the children born in Philadelphia, whose conception occurred during the prevalence of the cholera in 1832, there was a preponderance of females. The same result was shown in the births which took place in Paris, nine months after the cholera prevailed there in 1832. The births, at a somewhat later period after the visitation of the epidemic, exhibit an increase in the amount of males, in consequence, it is presumed, of the parents being endowed with vital energies above the average, as is shown by their exemption or recovery from the disease.—*Transactions of the American Med. Association*, vol. iii. p. 93. — Editor.

* Since it has been ascertained that the blood of the mother does not circulate in the vessels of the fœtus, but that this enjoys a sort of independent existence, the subject of fœtal nutrition has become one of great obscurity. The occurrence of well-authenticated cases in which children have been born without placenta, funis, mouth or anus, or any absolute connexion with the mother whatever, proves that they may be nourished by the fluids imbibed or absorbed by the cutaneous surface

198. Before describing the *circulation in the fœtus*, there are certain anatomical peculiarities which demand our notice:—1. There is a supplementary vein, situated at the thick edge of the liver, and leading from the umbilical vein to the vena cava ascendens, called the *ductus venosus:* 2. The septum between the auricles is imperfect, having in its centre a valvular oval aperture called the *foramen ovale:* 3. The pulmonary artery soon after its origin gives off a branch, the *ductus arteriosus*, which enters the aorta just below its arch. The general effect of these peculiarities is to render the heart virtually a single one, to provide for the quiescent state of the lungs, and to modify the distribution of fresh blood.

Different opinions have been given as to the course of the blood in the fœtus: I shall mention only two, Sabatier's and Winslow's. Sabatier's figure-of-8 circulation is thus described by Dr. Flood:—"The blood of the fœtus is conveyed from the placenta by the umbilical veins to the liver, through which it circulates, and then passes into the inferior cava. A portion of it, however, is transmitted in a comparatively pure state," through the ductus venosus, "which opens into the left hepatic vein, and then into the inferior cava. From the inferior cava the blood ascends into the right auricle, then by the foramen ovale into the left auricle, left ventricle, and arch of the aorta. A portion of the blood thus carried into the aorta descends into its thoracic part; the rest, after circulating through the head and upper extremities, returns by the superior cava to the right auricle, and passes thence into the right ventricle and pulmonary artery. A small part of this blood goes to the lungs by right and left branches; but the rest, conveyed by the ductus arteriosus, joins the blood that we left descending through the thoracic and abdominal aorta, and all that is not employed in the nutrition of the body and lower extremities, is returned by the hypogastric arteries to the placenta." The object of this theory is to show that the head and superior extremities receive a supply of purer blood, which they are supposed to need for their development; but there are great objections in the way:—1. Even supposing the pure blood was conveyed in the manner stated, it is too small in quantity to answer the purpose, being only one-fifth of the whole: 2. Supposing it to be sufficient, the presumed effects are not produced, the intestines, ribs, &c., being just as perfectly formed at birth as the brain: and 3. No such transmission of pure blood across the auricle, through the foramen ovale, can take place, because of the effects of gravity, the descending current from the superior cava, and, above all, because of the active contraction of the right auricle. We must therefore adopt Winslow's explanation,

A distinguished physiologist observes on this subject that, "The most plausible opinion he can form on this intricate subject is, that the mother secretes the substances, which are placed in contact with the fœtus, in a condition best adapted for its nutrition; that in this state they are received into the system, by absorption, as the chyle or the lymph is received into the adult, undergoing modifications in their passage through the fœtal placenta, as well as in every part of the system where the elements of the blood must escape for the formation of the various tissues.

"With regard to the precise nutritive functions executed in the fœtal state, and *first*, as concerns *digestion*, it is obvious that this cannot take place to any extent, otherwise excrementitious matter would have been thrown out, which by entering the liquor amnii, would be fatal to its important functions, and probably to the very existence of the fœtus. Yet, that some digestion is effected, is manifest from the presence of meconium in the intestines, which is probably the excrementitious matter arising from the digestion of the mucous secretions of the alimentary canal."—*Dunglison's Human Physiology*, 4th edition, vol. ii. p. 497.—Editor.

which assumes that the heart is virtually single and the blood mixed. According to him, "The blood of the system generally passes from the superior and inferior cava into the right auricle. One part of this is transmitted through the right auricle. One part of this is transmitted through the right ventricle and pulmonary artery, and thence (except a supply for the nourishment of the lungs) through the ductus arteriosus into the descending aorta; a second and larger part, passes through the foramen ovale into the left auricle, then into the left ventricle and arch of the aorta, the branches of which supply the head and upper extremities. The continued stream passes into the descending aorta, mixing with that already described; and all of it that is not employed in the nutrition of the body and lower extremities, is reconveyed by the umbilical arteries to the placenta."

199. The circulation of the fœtus is independent of that of the mother, though it may be sympathetically affected. By the stethoscope we hear the fœtal heart, which is found to beat from 120 to 150 times a minute: at the same time I must say, that it is not easy to reconcile this with the fact repeatedly verified by myself, that the pulsation of the cord when prolapsed, or when felt during the operation of turning, is much slower. I counted these pulsations the other day, and they amounted to 80, at the time when, I believe, the fœtal heart had been heard pulsating as usual.

200. *After birth* remarkable changes take place. From the painful impressions on the surface and senses, efforts are made by the child, which cause inspiration and end in crying, by which means the lungs are more or less inflated, and space is afforded for the pulmonary circulation, which supersedes the use of the foramen ovale and ductus arteriosus: the blood from the lower extremities cannot pass through the umbilical arteries, and does pass through the ascending cava into the right auricle and ventricle and thence into the lungs, where it undergoes analogous but more perfect changes, to those effected in the placenta, and is distributed to the body generally. By degrees, the foramen ovale closes, and the ductus arteriosus, ductus venosus, and umbilical arteries are obliterated; the adult circulation is then established.

Digestion takes place on the reception of food, the liver becomes more active, and the usual excretions of the kidneys and intestinal canal occur.

Before birth, the only sense in exercise was that of touch, but immediately afterwards, those of sight and hearing are called into activity, and at a later period those of taste and smell. A considerable time elapses before the sensuous impressions are correctly appreciated, yet every day adds its quota of instruction, and hourly experience at length produces accuracy.

The brain, which was perfectly quiescent during gestation, is now the focus for the impressions produced upon the senses, and the seat of such intellectual operations at can take place at so early a period, and the nervous system generally, is the centre to which all organic operations are referable.

201. In conclusion, I shall briefly notice the so-called *laws of development.*

The first of these is the law of *unity of organization*, in virtue of which "the progressive phases of the embryo, correspond to the abiding forms, which are preserved in the total organism of animated nature as typical

of its gradative evolution; and that as the embryo of each higher animal passes rapidly through the forms of the animals inferior to it in order to attain its maturity and specific rank of being, that of man is transitively the compendium of all; not, indeed, without a difference, since in each instance, the changing form of the embryo bears the impress of the transitional and incomplete character, while it ever preserves the promise and prophecy of the being into which it is to be finally evolved." This law of transitive development, so eloquently described by Mr. Green in the extract I have quoted from his Hunterian oration, has been established by the researches of Wolff, Otto, Meckel, and other German physiologists; but it is only just to state that the idea was familiar to our great natural philosopher John Hunter, who remarks, "If we were capable of following the progress of increase of the number of the parts of the most perfect animal, as they are formed in succession, from the very first, to its state of full perfection, we should probably be able to compare it with some one of the incomplete animals themselves, of every order of animals in the creation, being at no stage different from some of those inferior orders; or, in other words, if we were to take a series of animals from the more imperfect to the perfect, we should probably find an imperfect animal corresponding with some stage of the perfect."

In accordance with this law, we find the fœtal nervous system at the earliest period resembling that of the annelides, then that of the invertebrata, and afterwards that of fishes, reptiles, birds, &c. The same may be said of other organs, and we have already given an example in the case of the uterus (§ 91).

More striking illustrations may be derived from certain abnormal deviations, of which Mr. Green remarks, "and it did not escape Hunter, as a consequence of the same law, that congenital defects, hitherto comprehended under the vague designation of monstrosity, are to be explained by the development of the embryo being interrupted at some early stage of its regular evolution, and that the defective form which is the result, is analogous to the form and structure of an inferior class."

Thus we have the law exhibited in the successive transitions of the fœtus until its arrival at its perfect state; and, if possible, more strikingly illustrated by those exceptions, where it fails to attain this perfection.*

* One of the most remarkable of these congenital defects is the "spontaneous amputation of the fœtal limbs in utero," so well described by Dr. Montgomery of Dublin. Since the publication of his paper in the year 1832 (Dublin Journal of Medical Science vol. i. p. 140), the subject has attracted a good deal of attention in Europe, and also in this country, and several very interesting cases have been detailed: in some, it seems to have been caused by the umbilical cord encircling the limbs and acting as a ligature; in other cases the origin of the ligature has been ascribed by Dr. Montgomery to organized lymph. Professor Gurlt, of the Royal School of Medicine at Berlin, in a paper published by him in 1833, regards, "these threads as prolongations of the egg membrane from which the fœtus grows, whether this skin (or membrane) be taken as the navel bladder or the amnion," and "objects to their being considered as formed by organized lymph," as supposed by Dr. Montgomery. "The prolongations of the membrane," Gurlt thinks, "are afterwards, by the constant motions of the fœtus, twisted into slight but firm cords, or threads, which may involve different portions of the fœtal limbs, (as we sometimes find the umbilical cord several times round the neck, or other parts of the child's body,) so as to stricture them, and cause their separation; in this way he explains the presence of the ligatures concerned in the production of spontaneous amputation."

For further information on this curious subject the reader is referred to Dr. Montgomery's essay, contained in his invaluable work on the "Signs and Symptoms of Pregnancy."—Editor.

202. The other law I shall notice has also received its most impressive elucidation from certain exceptions: it is called the *law of symmetry*, conjugation, or affinity, founded upon the general observation that all formations proceed from the circumference to the centre. According to M. Serres, the body generally, and each organ, whether single or double at birth, is originally divisible into two parts, that each half grows towards the mesial line, where it meets its opposite and is joined to it, as we saw in the case of the dorsal and ventral laminæ. If the law of progression be equally observed by both halves, the organ resulting from their union will be perfect; if the growth be unequal, deficient, or excessive, the result will be deformity by defect or excess. Again, connected with this law of symmetry, and perhaps causing its deviations, is the fact that development of each part of the body is to a certain extent dependent upon its vascular supply; if this be deficient or in excess, so most probably will be the other.

203. We are now able to classify to a certain extent the deviations from the normal formation of the fœtus, viz. into those whose deformity results from an arrest of the transitive development, those arising from irregularity of symmetrical growth, and those dependent upon vascular irregularities. Others still remain, however, the larger class probably depending upon diseased action in the organs or structures of the fœtus or of its dependencies, and some which it is very difficult to explain at present.

CHAPTER V.

SIGNS OF PREGNANCY.

204. Having now described minutely the process of utero-gestation, let us examine the signs and symptoms to which it gives rise, and by which it may be detected. I need say but little as to the importance of such an inquiry, or of the responsibility which is incurred by a physician, when his opinion is demanded. The honour, and therefore the happiness of a female, may depend upon his decision, the peace of families may rest upon it, and the inheritance of property be controlled by it. The limits of this work oblige me to treat the question rather as a physiological than a medico-legal one; but although much is omitted which might be available in the latter point of view, all that is adduced applies equally to both. In all such cases, the reader is to remember that he may not merely be requested to investigate a case of doubtful pregnancy where no shame is evolved, but that he may be consulted in cases where pregnancy is concealed by unmarried women, or by married women under certain circumstances, to avoid disgrace; and on the other hand, where it is pretended in order to secure an inheritance, to extort money, or to delay punishment. In considering each "sign" I shall endeavour to state its value as *evidence*, as well as to describe its characters as a *symptom*.

205. The signs of pregnancy have been variously classified, and no doubt in a formal treatise a scientific classification is necessary; but in a

brief summary like the present, it appears to me that it will be more useful to take them rather in the order of time in which they are developed, by which means the student will find grouped together, the early evidences of pregnancy, and again, those indicative of more advanced gestation.

206. The *general condition* of a pregnant woman is plethoric, the pulse is quicker and fuller, the quantity of circulating fluid is said to be augmented, and its quality altered by the increase of fibrine, judging from the prevalence of the buffy coat in blood taken under such circumstances.

Well-marked sympathies are excited in distant organs which often amount to distressing irritation, and the nervous system may suffer both primarily and secondarily. Variations in temper and disposition are of frequent occurrence, as well as caprices of taste. The chylopoietic viscera are often deranged, and the secretion from the kidneys altered. The skin may change its colour, and become sallow or discoloured in patches, though in some cases it becomes more florid, with occasional eruptions on the face. Some women become fat during pregnancy, others lose flesh.

But in some particulars, the deviations from the ordinary state are more remarkable, and constitute the special signs upon which our diagnosis must be grounded; these we shall now notice, previously remarking that the diagnosis of early pregnancy is no easy task, but one which requires the greatest care and discrimination.

207. Cessation of menstruation. — One of the first circumstances which leads a female to suspect that she is pregnant, is the non-appearance of the catamenia at the proper time, and if at the second period they are still absent, it is deemed conclusive, or nearly so.

No doubt this is one of the most unvarying, as it is one of the earliest results of pregnancy. But, strictly speaking, it is not conclusive, inasmuch as the discharge may recur for some months after conception, or even monthly during the whole period of utero-gestation. Such cases have been recorded by Maureceau, Puzos, Desormeaux, Johnson, Frank, Dewees, Kennedy, Montgomery, &c., and several such have occurred to myself.*

Again, conception may take place previous to menstruation, or immediately after ceasing to give suck, before it has had time to occur. Nay, some cases are on record where women menstruated only during gestation.

Lastly, the catamenia may be arrested by disease of various kinds, and it is even possible for pregnancy to occur in such cases.

If then, menstruation may be suspended by other causes on the one hand, and may continue, notwithstanding pregnancy, on the other hand, it is evident, that by itself, the cessation of menstruation is not a *proof* of conception, although it is of considerable value (inversely as to the fre-

* Dr. Meurer has recorded a remarkable instance of menstruation during pregnancy in a woman, ætat. 27, who was pregnant for the fourth time when he wrote. "She always has had her menses regularly during pregnancy, and only during that time. They come on without any illness: and she has always borne healthy children, at the full period. While unmarried, and except during pregnancy, she never menstruated, but she was never unwell from it. Her general appearance is rather masculine; it appears, therefore, that in her, as in all viragos, the sexual functions require a powerful excitant, such as pregnancy, to cause them to be energetically performed." — *London Medical Gazette*, Nov. 1840, from *Med. Correspondenzblatt*, Bd. 9, No. 31. — Editor.

quency of the exceptions) as evidence, especially combined with other signs. I may add that in cases of concealed pregnancy, the woman sometimes stains her linen with blood, in order to simulate this discharge.

208. Morning Sickness.—The intimate sympathy between the uterus and stomach, is shown by the irritability of the latter soon after conception. Most women suffer more or less from nausea and vomiting, especially on rising in the morning; hence it is termed "the morning sickness." The irritability may commence immediately after conception, as in two cases mentioned by Dr. Montgomery; but more generally it sets in about the fifth or sixth week, and ceases soon after the third month. The daily attack lasts but a short time, from ten minutes to an hour, after which the patient completely recovers, and is able to take food.

As an evidence of pregnancy, its recurrence at the regular time and in the usual manner, is of great value when combined with other symptoms, but the exceptions and irregularities are sufficiently frequent to render it more doubtful if taken alone; for it may be altogether absent, and yet the patient be pregnant, or if present, it may occur at unusual times, or with extraordinary violence: with some women it occurs during the night only, with others it lasts during the entire day, and may continue throughout the period of gestation. On the other hand, it may be present as morning sickness, from various causes, and yet the patient not be pregnant.

Dr. Ramsbotham remarks, that when vomiting "is entirely absent, utero-gestation does not proceed with its usual regularity and activity;" and so far my experience agrees with his, that irregularities in this particular are frequently followed by deviations in the other symptoms of pregnancy.*

209. Salivation.—The irritation caused by pregnancy may affect the salivary glands, and induce salivation, although it is not of very frequent occurrence. It is enumerated by Hippocrates and the earlier writers as one of the signs of pregnancy; but recent authorities consider it of less value. Cases, however, are mentioned by Dewees, Montgomery, and others. Several such have occurred to myself, in which it commenced at an early period, was very profuse, but unaccompanied by swelling or tenderness, and ceased spontaneously, in one case, about the fourth month, in another about the fifth, and in a third about the eighth. As Dr. Montgomery has observed, it is "easily distinguished from the ptyalism induced by mercury, by the absence of sponginess and soreness of the gums, and of the peculiar fœtor, and by the presence of pregnancy."

210. Mammary Sympathies.—About two months after conception, the attention of the female is attracted to the state of the breasts. She feels an uneasy sensation of fulness, with throbbing and tingling pains in their substance and at the nipples. They increase in size and firmness, and

* "This remark does not entirely correspond with my experience," remarks Dr. Huston, in a note to a former edition. "I have known many women proceed regularly through their pregnancy, and be safely delivered of healthy children, without experiencing the least degree of morning sickness. But where a woman labouring under this disturbance is suddenly relieved, before the usual time for its cessation, there is reason to apprehend some mischief to the ovum, the more especially if she has been exposed to any mental or other cause capable of strongly impressing the nervous or vascular system."—Editor.

have a peculiar knotty glandular feel; the areola darkens, and after some time, a milky fluid is secreted.

But it must be recollected that the breasts may enlarge from other causes; this happens with some women at each menstrual period, when the catamenia are suspended, or after they cease; and at such time a milky fluid may be secreted. Distension of the uterus from hydatids or other causes, is accompanied by a change in the breasts. On the other hand Gardien and Mahon have remarked, that when menstruation takes place during the early months of gestation the swelling and pain of the breasts are absent, and Dr. Montgomery mentions a case in which no alteration took place until after delivery, in consequence of the delicate state of the patient's health.

In the virgin state the *colour* of the *nipple* and *areola* differs comparatively little from that of the surrounding skin; it is generally a few shades darker, but sometimes scarcely that.

But after conception a great change is observed in most women, though less marked in those of very light complexions. The first alteration perceptible is "a soft and moist state of the integument, which appears raised and in a state of turgescence, giving one the idea, that if touched by the point of the finger, it would be found emphysematous; this state appears, however, to be caused by infiltration of the subjacent cellular tissue, which, together with its altered colour, gives us the idea of a part in which there is going forward a greater degree of vital action than is in operation around it, and we not unfrequently find that the little glandular follicles or tubercles, as they are called by Morgagni, are bedewed with a secretion sufficient to damp and colour the woman's inner dress." The above is an extract from Dr. Montgomery's work, to which, and the plates accompanying it, I beg to refer the reader. This first change in the areola takes place at an early period; Dr. Montgomery states that he has recognised it at the end of the second month. "During the progress of the next two months, the changes in the areola are in general perfected, or nearly so; and then it presents the following characters; a circle round the nipple,

Fig. 69.

whose colour varies in intensity according to the particular complexion of the individual, being usually much darker in persons with black hair, dark eyes, and sallow skin, than in those of fair hair, light-coloured eyes, and

delicate complexion. The extent of the circle varies in diameter from an inch to an inch and a half, and increases in most persons as pregnancy advances, as does also the depth of the colour." "In the centre of the coloured circle, the nipple is observed partaking of the altered colour of the part, and appearing turgid and prominent, while the surface of the areola, especially that part of it which lies more immediately around the base of the nipple, is studded over and rendered unequal by the prominence of the glandular follicles, which, varying in number from twelve to twenty, project from the sixteenth to the eighth of an inch; and lastly, the integument covering the part appears turgescent, softer, and more moist, than that which surrounds it, while on both there are to be observed at this period, especially in women of dark hair and eyes, numerous round spots or small mottled patches of a whitish colour, scattered over the outer part of the areola, and for about an inch or more all around presenting an appearance as if the colour had been discharged by a shower of drops falling on the part." Dr. Montgomery fixes the time of this peculiar appearance at about the fifth month, at which time the breasts have become full and firm with large veins ramifying on their surface. After the sixth month, a number of silvery streaks like cracks may be observed, the result of overdistension.

To these well-marked changes in the areola and nipple there are many exceptions; the colour, which is in general the most prominent alteration, may not deepen so decidedly; and many cases of women of light complexions occur, in whom it scarcely differs from the surrounding skin. Besides, as Dr. Ingleby has well remarked, "when the colour of the integument around the nipple has been once modified by pregnancy and nursing, it is no longer, I think, a conclusive criterion." Again, in other cases the sebaceous glands are but slightly developed; but I have almost invariably observed the puffy state of the areola in first pregnancies. If the fœtus die, the changes are arrested and gradually decline.

On the other hand, something resembling the deepened colour of the areola, as well as enlargement of the mammary gland, is said to be present, when the uterus is distended from other causes; and I have repeatedly seen the follicles developed in patients neither pregnant nor nursing. Upon the whole, however, the changes in the breast and nipples are certainly the most unequivocal of all the early signs of pregnancy.

211. *Milk in the breasts*, although a popular evidence, much relied upon, can scarcely be considered of any value at all. It is true, we do often find it at an early period, and generally at a later; yet it occurs so frequently without pregnancy, that no certain conclusions can be drawn from it. For instance, Baudelocque mentions the case of a girl of eight years old, who milked her breasts in the presence of the Royal Academy of Surgery, October 16th, 1783, and Belloc another; in both, the secretion was apparently the result of the application of a child to the breasts. A similar case, but in a woman, is related by Mr. Semple in the North of England Med. and Surg. Journal, vol. i. p. 230. Milk is also occasionally secreted at each return of the catamenia, and may remain very long after weaning. Foderè mentions that he has frequently known it secreted at the final cessation of menstruation.*

* Some very remarkable cases of mammary secretions, both in the male and unimpregnated female, are cited in Dunglison's Human Physiology. — Editor.

212. From what has preceded, the student will have gathered that the diagnosis of pregnancy in the early months must be more or less doubtful. No single sign can be relied on as conclusive; it is only when two or three are present, and occur in proper sequence, that we can feel certain. For example: if a patient miss one or two periods, we may have grounds for suspicion, and these will be strengthened if morning sickness occur in the second month; but if to these be added enlargement of the breasts and darkening of the areola, the case will be pretty certain.* In many cases, too, we may derive assistance from the character and circumstances of our patient. It is not, however, until the latter half of gestation tha we obtain positive evidence, which can neither be simulated nor evaded. This we shall now consider.

213. Enlargement of the abdomen.—The gradual distension of the uterus has already been described (§ 157) as tolerably equable, enabling us to estimate the period of pregnancy by the height to which it has attained in the abdomen. During the early months, although it be not perceptible above the pubis, yet the abdomen increases by degrees, owing to the intestines being pushed up from the pelvis. This enlargement, however, is variable, owing to the distension of the intestines by gas or fæcal accumulation. In some cases, the abdomen even becomes flatter at first, from the sinking of the uterus in the pelvis; but it soon increases again, and by the end of the third month it is visibly but equally enlarged. During the fourth month, the womb ascends above the symphysis pubis, and may be felt as a rounded tumour, which goes on augmenting till it occupies the whole abdomen. When it reaches the umbilicus, it pushes it forward, so that in the sixth and seventh months, it is more level with the surrounding skin, and afterwards it projects beyond it in most women.

The *feel* of the abdomen distended by the uterus is very different from the impression it gives when the distension is caused by fluid, flatus, &c. The uterine tumour is firm, hard, elastic, and defined, preserving its form in all positions of the body, though more remarkable when the patient is upright; whereas in ascites the defined tumour is wanting, the fluid obeys the law of gravitation, and the abdomen has not the same firm elastic feel. The best mode of examining the uterine tumour, is to make the patient first stand up, and then lie down; this will demonstrate the form of the womb better than keeping in one position; and after lying for some time, the uterine parietes become relaxed and less firm. Percussion will distinguish between pregnancy and tympanites.

Nevertheless cases do occur which are very embarrassing; for the uterus itself may be distended by air, fluid, or hydatids, and then the form of the uterus and abdomen will be the same as in pregnancy. In such cases, our guide must be the history of the case, and further investigation into the contents of the uterus. I have already described the changes which take place in the cervix (§ 158).

214. Quickening.—This term was applied to the mother's perception of the first movements of the fœtus, under the erroneous belief that it was its first movement, as it then became alive or quick. We know that the fœtus is alive from the moment of conception, and have little doubt but

* According to recent observations, certain alterations in the urine, believed to be peculiar to pregnancy, are to be regarded as among the earliest indications of that condition—these are described under the head of Kiesteine, in § 226. — Editor.

that movements take place at a much earlier period. By modern writers, then, the term is applied to the first perception of movement on the part of the mother, which generally occurs about four or four and a half months after conception, though some feel it earlier, and others not till afterwards. Dr. Montgomery observes, "Experience has shown that it happens from the tenth to the twenty-fifth week; but according to my experience, the greatest number of instances will be found to occur, between the end of the twelfth and sixteenth weeks after conception, or adopting another mode of calculation, between the fourteenth and eighteenth week after the last menstruation." Out of one hundred cases, Rœderer found that eighty quickened at the fourth month, and of the remaining twenty, some at the third and some at the fifth.

The sensation is at first like a feeble pulsation; and though so slight, is often accompanied by sickness of stomach and faintishness, or even complete syncope. By degrees it becomes stronger and more frequent, until the movements of the different extremities are distinguishable. Authors are not agreed as to the explanation of quickening, or why the movements are felt at the fourth month or thereabouts, and not earlier. I think, upon the whole, that the most probable explanation is the one which the late Dr. Fletcher, of Edinburgh, used to give in his lectures. "The movements of the fœtus while the uterus is in the cavity of the pelvis are not perceived, because the uterus is not supplied with nerves of sensation, and it is surrounded by parts similarly deficient; but when it emerges from the pelvis, it comes in contact anteriorly with the abdominal parietes, which are liberally supplied with sensitive nerves, and which by contiguity of substance, feel the movements, and thus the woman becomes conscious of them." This view is strengthened by the fact, of which I have been repeatedly assured, that the movements, unless when violent, are felt in front only.

Its value as a sign of pregnancy is somewhat impaired by the interval which frequently intervenes between the first faint sensations and their repetition; by the late period at which they are felt in some cases; and in a medico-legal point of view, by our being dependent upon the evidence of the patient herself; or the patient may be deceived by flatus in the intestines. On the other hand, cases occur where no sensation is perceived by the mother. "Of this fact," says Dr. Montgomery, "the writer can speak with certainty, having now in several instances, by applying his hand to the abdomen, distinctly felt the motions of the fœtus in utero, while the mother had no perception of them."

215. The *movements of the fœtus* may be felt by the practitioner some little time after quickening, by placing the hand, especially if it be cold, upon the abdomen; and the impression will of course be in proportion to the vigor of the motions.* At an advanced period, it would not be easy to mistake them; but we may be deceived at an earlier period; Dr. Blundell relates a case of a woman who possessed the power of simulating these movements by the action of the abdominal muscles.

* Dr. Simpson stated, at a late meeting of the Edinburgh Obstetrical Society, a variety of observations and experiments showing that, contrary to the commonly received opinion, the mere application of cold (as a cold hand, &c.) to the surface of the abdomen of a pregnant woman, had not the effect of exciting motions in the fœtus. The application of portions of ice even, of the size of the hand, had no such effect. — *Monthly Journ. Med. Sci.*, July 1830. — EDITOR.

Dr. Tyler Smith describes two abdominal movements in the latter months of pregnancy — one traversing irregularly over the abdomen, giving a feeling of ridges or prominences to the hand, and the other like a shock or impulse; the former he regards as due to the peristaltic movements of the uterus, and the latter only to the fœtus, and I must confess I think there is great weight in his arguments. I am happy to express my obligations to his recent work ("Parturition and Obstetrics"), which I regard as one of the most important and ingenious that has appeared for many years, both, as expressing more clearly, the "idea" of uterine and ovarian physiology, and also as giving to it for the first time the unity of a system.

216. Ballottement.—A vaginal examination will enable us to ascertain not merely the state of the cervix, but also to decide upon the presence of a fœtus, by repercussion or *ballottement*, as it is termed by the French. The patient should be in the upright position; or if she be in bed, her shoulders should be raised; the operator must then introduce his forefinger, and place it upon the cervix uteri, whilst the other hand is employed to keep the uterine tumour steady, then suddenly but slightly jerking upwards the point of his finger, he will feel a sensation of something having receded from it, and which he will perceive to fall again on

Fig. 70.

A. Vertical section of the sacrum.
B. Rectum.
C. Uterus and ovum.
D. Bladder.
E. Finger in the vagina, with its extremity pressing up the uterus.

This cut exhibits the manner of making this examination.—Editor.

the point of his finger in a moment or two. The jerk of the finger upon the head of the fœtus causes it to float upwards a little in the liquor amnii, and its own weight makes it descend. Dr. Montgomery justly remarks that "should this be distinctly felt, it is proof positive of a fœtus in utero, there being no other condition or disease of the organ, in which a solid body can be felt in this way floating in the cavity." Of course it proves nothing as to the life of the child. The period when this test is most available is during the fifth and sixth months.

217. Auscultation.—M. Mayor of Geneva first applied, in 1818, auscultation to the diagnosis of pregnancy; he was followed in 1821 by M. Lejumeau de Kergaradec, and since his time the investigation has been pursued with zeal and intelligence by Haus, Hohl, Kennedy, Montgomery, Naegelè, jun., &c. M. Mayor observed only the sounds of the fœtal heart, but M. Kergaradec detected not only this double sound, but another single, whirring sound, which he called the "*bruit placentaire*"

because he believed it to be situated in the placenta. To these two sounds Dr. E. Kennedy has added a third, which is heard only occasionally, the pulsation in the funis. Each of these deserves a separate investigation.

As to the mode of making the examination, it may be effected with the naked ear applied to the abdomen, or by the stethoscope; the latter is preferable, as it enables us to define and limit the sound, and in most instances it is more convenient. The patient, if possible, should be placed on her back in bed, with the head raised, and the abdomen covered only by the night-dress. In this way we can obtain access to all parts of the uterine tumour, except posteriorly, and by turning the patient to one side or the other, we can easily examine the lateral portions. The auscultator should place himself in the easiest posture possible, especially avoiding a dependent position of the head, in which case he would be apt to mistake the throbbing of his own arteries for sounds communicated from the patient. The stethoscope should be placed lightly upon the abdomen, and the pressure be varied, in order to ascertain whether the sounds are in any degree modified by it.

218. The Uterine Souffle, or *bruit placentaire*, is a single intermitting whirring sound, heard over a certain extent of the uterine surface. It has been compared to the sound of a pair of bellows, to that made by gently blowing over the mouth of a bottle, and to that heard when a shell is applied to the ear, &c. Perhaps the best comparison is with the "*bruit de soufflet*" of the heart, which is doubtless sufficiently familiar to all. Dr. E. Kennedy remarks, that it assumes all the variations of the latter sound, viz., the rasping or sawing sound, the musical or hissing sound, a sound resembling the cooing of a dove, and a drone resembling that of a bagpipe, accompanying the sound, yet without interfering with it.

It is stated by Hohl and others, to be limited to the situation of the placenta (§ 175), and so it is generally; but in many cases it extends to some distance, and in others, according to Naegelè, it may be heard in almost any part of the uterus: he further states, that it may constantly be heard at the lower part of the uterus, by applying the stethoscope near Poupart's ligament. I cannot say that I have been able to verify the latter statement, but I have found it very possible to produce a souffle in that situation by a little extra pressure of the stethoscope.

219. The period when it first becomes audible is about the fourth month, according to Montgomery, Hohl, and Naegelè; Dr. E. Kennedy states that he has succeeded in detecting it as early as the tenth week; and on the other hand, it cannot be heard in some cases until the fifth month. It may, however, always be distinguished before the pulsations of the fœtal heart; and even when the fœtus perishes, it continues for some time afterwards. It is feeble when first heard, but increases in intensity and strength; the intensity, however, is subject to some variation. It is synchronous with the mother's pulse, and subject to its varieties, but without impulse. During labour its intensity varies; in the upper part of the uterus it is frequently inaudible during a pain; after delivery it ceases entirely, though not always instantly.

220. M. Kergaradec, as I have already said, placed the seat of this sound in the placenta; more recent investigations, however, have decided that it is situated in the uterus. Dr. E. Kennedy conceives it to result

from the difference between the calibre of the arteries supplying the uterus and the uterine sinuses: that the expanding current of blood rushing from an artery into a larger sinus gives rise to the sound, just as the passage of blood through a constricted valve of the heart or aorta, does to the bruit de soufflet. Other explanations have been given, but all are agreed now that its seat is in the uterus, and not in the placenta; and most, I believe, that it indicates the position of the latter organ.

221. As a test of pregnancy, its *positive* value (that is, its being audible) is very great, though not quite conclusive, as it is heard sometimes in cases of disease, of which I had a remarkable instance under my own care, and may occasionally be produced by too great pressure of the stethoscope upon an artery. Neither does it prove that the fœtus is alive, in cases of pregnancy, as it is observed to persist for a short time after the death of the child; it is heard also in some cases of blighted ova which have degenerated into moles.

On the other hand, its *negative* evidence (our not being able to detect it) is of much less value, as we may not be able to hear the sound although the patient be pregnant, probably from the placenta being attached posteriorly.*

222. Pulsation of the Fœtal Heart. — Very different from the uterine souffle is the sound which attracted the attention of M. Mayor, the pulsation of the fœtal heart. It consists of a rapid succession of short, regular, double pulsations, resembling those of the adult heart, except in force and frequency. The sound is like the muffled ticking of a watch, or, as Naegelè remarks, like the pulsations of the heart of a new-born child. Their frequency is about double those of the adult, or from 120 to 140 in a minute. M. Naegelè, jun. found that in 600 cases the average frequency was 130 strokes in a minute. I have already stated my inability to explain the discrepancy between the pulsations of the heart, and those of the cord dependent upon it, as to frequency.

The variations in strength and rhymth of the pulsations of the fœtal heart, are very numerous and not easily explained; no doubt many are caused by changes in the condition of the fœtus itself, and others by impressions received from the mother; for although the fœtal circulation is independent of that of the parent, yet there is so intimate a sympathy, that disturbances in the maternal system are communicated to that of the fœtus, some (in case of sudden shocks) immediately, and others (in case of disease) more tardily.

The situation in which the fœtal heart is heard most distinctly, is about the middle or inferior abdominal region, more frequently on the left than on the right side. "The extent of surface," says M. Naegelè, jun. in

* With regard to the "*souffle placentaire*," of Kergaradec, authors are not yet agreed. Dr. Rigby remarks that "later observations have shown that it is not connected with the placenta, but depends upon the increased vascularity and peculiar arrangement of the uterine vessels during the gravid state."

There is much reason to doubt whether the "*souffle placentaire*," or the "*uterine souffle*," does not depend wholly on compression of the maternal vessels by the enlarged uterus. Professor Dunglison informs me, (remarks Dr. H., in a note to a former edition,) that he heard it in one case of fibrous tumour of the uterus: and I am satisfied that I heard it in a similar case, and also in one instance from the presence of a greatly enlarged ovary. If these observations be correct, the sound is extra-uterine, and therefore not indicative of pregnancy farther than as that state is likely to be connected with enlargement of the uterus. — Editor.

his treatise on Auscultation, translated by Dr. West, p. 41, "over which the beating of the heart is heard, cannot be accurately defined in inches and lines, but it is certainly audible through a larger space than most observers have represented. Its sounds reached beyond the linea alba towards the other side, in one hundred and eighty-five of three hundred and seventy cases, in which the position of the fœtus with its back to the left side of the mother was distinctly ascertained by the ear, and afterwards verified by the result of the labour; in forty-six, they were audible over nearly the whole abdomen; while in one hundred and thirty-seven, they were confined to the left side, and did not reach the mesial line. The heart's sounds were audible beyond the mesial line, only in forty-five of one hundred and eighty-five instances, in which the back of the fœtus was directed to the right side; one hundred and fourteen times they were distinguishable on the right side only; but in twenty-six they extended over the whole abdomen. In all these instances in which the heart's sounds were not limited to one lateral half of the abdomen, their greater intensity at one part indicated the situation of the back, and consequently the position of the fœtus."

The earliest period at which the pulsations can ordinarily be detected is the middle of the fourth month or the beginning of the fifth. Dr. E. Kennedy has heard them in a few instances before the expiration of the fourth month. Dr. Montgomery fixes the end of the fifth month. The earliest period mentioned by Naegelè, is the eighteenth week, in thirty out of fifty patients, who were examined before the middle of pregnancy. In some cases they did not become audible before the fifth month. It is easy to conceive that various circumstances may impede the transmission of the sound, and so alter the time at which it would otherwise be first heard; as, for example, excess of liquor amnii, thickness of the abdominal parietes, or feebleness of the fœtus.

223. When the pulsation of the fœtal heart is heard, it is proof positive of pregnancy, equally remote from imitation or evasion. The only circumstances at all likely to embarrass us for a moment, are the sounds of the maternal heart, which may sometimes be heard; the sound of the contraction of the abdominal muscles; or of the uterine arteries; but the greater rapidity, and clearer though feebler sound of the fœtal pulsations, will distinguish them with facility.

On the other hand, the pulsations being inaudible, is not conclusive proof that the patient is not pregnant, as the child may have died, or, as in some rare cases, they may be inaudible for a time, though the fœtus be living. I know this to be the fact, though I cannot explain it.

224. Pulsation of the Umbilical Cord, or *funic souffle*. — If the position of the funis be favourable, as, for instance, if it be twisted round the neck, body, or limbs of the fœtus, or in any way placed between the fœtus and the anterior or lateral parietes of the uterus, it is quite possible, as Dr. E. Kennedy has shown, to hear the pulsation of its arteries, corresponding to the fœtal heart's action. Both Haus and Hohl have denied this, but without just reason, in my opinion, for Dr. E. Kennedy states that "in some cases were the parietes of the uterus and abdomen were extremely thin, he has been able to distinguish the funis by the touch externally, and has felt it rolling under the finger, and then applying the stethoscope, its pulsations have been discoverable, remarkably strong."

Professor Naegelè, jun., agrees with Dr. E. Kennedy as to the seat of the pulsation, and attributes it to the tortuosity of the arteries, and to the dilatations observed in them. Occasionally the sound is rather a souffle than a pulsation, but fainter than the uterine souffle, and distinguished from it by its being synchronous with the pulsations of the fœtal and not the maternal heart. Dr. E. Kennedy found that he could produce the souffle, by pressing slightly upon the cord with the edge of the stethoscope.

225. We have now examined the principal signs developed during the latter half of pregnancy, — to wit, enlargement of the abdomen, quickening, the motions of the child, ballottement, and the results of auscultation, and we find that whilst all are valuable, there is a degree of uncertainty attached to the first three which calls for a very careful estimate on our part: that the *positive* evidence of the latter modes of investigation is conclusive, but that the *negative* evidence, or absence of the usual results, is not proof that the patient is not pregnant. So that, as was before observed, we ought rather to depend upon the coincidence of two or more of the signs of pregnancy than attempt a diagnosis from any one alone: the only sign indeed which can be regarded as itself proving that the woman is pregnant of a living child is the pulsation of the fœtal heart.

226. Kiesteine. — There are two other signs which I have deferred noticing until now, because they require more research to entitle them to a place among the recognised evidences of gestation, and it seemed better that the student's attention should rather be directed to those considered valid, than embarrassed by doubtful ones. The first of these tests is derived from the urine. M. Nauche was the first who accurately described the change which takes place in the urine of pregnant women. He found that "by allowing the urine to stand for some time, in thirty or forty hours a deposite takes place of white, flaky, pulverulent, grumous matter, being the caseum, or peculiar principle of the milk formed in the breasts during gestation." This deposite has lately received the name of *Kiesteine*. M. Eguiser has published the result of his researches on the subject in the Lancette Française, Feb. 1839, p. 36. He states that "the urine of a pregnant woman, examined in the morning, is generally of a pale yellow colour and slightly milky; it first reddens and then turns blue the '*papier tournesol*,' as ordinary urine. Exposed to the contact of air, a cloudiness is observed from the first day, resembling fine wool; from the first day also, a white matter is deposited. These phenomena are not, however, constant. From the second to the sixth day, small opaque bodies are seen rising from the bottom to the surface of the fluid, and then collecting together until they form a layer, covering the whole surface; this is kiesteine. It is sufficiently consistent to be raised from off the fluid. It is whitish, opaline, slightly granular, and resembles much the layer of fat which swims on the surface of fat broth when cool. Examined by the microscope, it appears a gelatinous mass of indeterminate form. When it is old, cubical crystals are sometimes detected." "It persists thus for three or four days; the urine then becomes troubled; small portions are detached from its surface, and sink to the bottom, until the layer is entirely broken up. Kiesteine appears to exist in the urine from the first month until the period of delivery." Dr. Montgomery seems to think this appearance constant, when the deep colour and turbid condition of the urine permit of observation.

Dr. Golding Bird has published a series of experiments on this subject in Guy's Hospital Reports, No. 10, which confirms the value of this test. The pellicle formed in the urine of 27 out of 30 pregnant women, and it was found only in two instances out of a number, in the urine of unmarried women. I shall quote his conclusions: — 1. "That certain organic matters, closely resembling, if not identical with, caseous matter, mixed with abundance of the earthy phosphates in a crystallized state, are eliminated from the blood during pregnancy; and if not otherwise removed are taken up, and finally thrown out of the system by the kidneys. 2. That certain accidental circumstances, especially connected with those morbid actions in which the kidney is called upon to perform a compensating function for the skin, as indicated by the abundance of azotized matter in the form of amorphous lithate of ammonia in the urine, interfere temporarily with the development of caseous matter, as they do in checking the cutaneous and other secretions. 3. That, taken in connexion with other symptoms, as the formation of a dark areola round the nipple, and cessation of menstruation and abdominal enlargement, the formation of a caseous pellicle in the urine affords a very valuable corroborative indication of the existence of pregnancy."

This subject has recently been investigated by Dr. E. K. Kane, in the Philadelphia Hospital, and he has arrived at the following conclusions: —

1. That kiesteine is *not peculiar* to pregnancy, but may occur whenever the lacteal elements are secreted without a free discharge at the mammæ.

2. That though sometimes obscurely developed, and occasionally simulated by pellicles, it is generally distinguishable from all others.

3. That when pregnancy is possible, the exhibition of a clearly defined kiesteine pellicle is one of the least equivocal proofs of that condition; and

4. That when this pellicle is not found in the more advanced stages of supposed pregnancy, the probabilities, if the female be otherwise healthy, are as 20 to 1 (80 to 4) that the prognosis is incorrect.* †

227. Jacquemin's test. — This consists in a violet colour of the mucous membrane of the vagina and labia, dependent probably upon pressure above. M. Parent Duchalet confirms the result of M. Jacquemin's observations, which he states were made upon a large number of pregnant women, and that the change of colour was never absent. I had lately an opportunity of minutely examining a well-marked case, and found that the violet colour was caused by a great number of small veins in a varicose condition.

228. Twin Pregnancy. — The inadequacy of the signs which are

* American Journal of Med. Science, July 1842.

† Recently a new animal substance is alleged by Dr. Stark to have been discovered by him in the urine of pregnant women, to which he has given the name of "*gravidine*," both on account of its occurring during the state of pregnancy, and of its falling to the bottom of the vessel as the fluid containing it cools. "This substance," he avers, "is a matter sui generis; a proximate substance or principle forming in some measure a connecting link between the albuminous and gelatinous principles." The reality of Dr. Stark's discovery is disputed by Dr. Griffith of the Finsbury Dispensary, and can hardly be considered as admitted by the profession. *Braithwaite's Retrospect of Medicine and Surgery*, vol. vi. p. 241, 1842. — Editor.

commonly stated to indicate plural pregnancy, must have been felt by every accoucheur. Those upon which the greatest reliance is placed are, the disproportionate size of the abdomen compared with the period of gestation; the flattened state of the abdomen in front, with the appearance of being divided into halves; the inequality of its surface; the tumultuous movements of the fœtus; the inordinate weight and distension; and the excessive œdema of the lower extremities. No doubt many of these circumstances may be observed in twin pregnancy; yet none of them are sufficiently distinctive, while several may arise from other causes.

M. Hohl has remarked that in twin cases the uterine souffle is heard "over a large surface, with greater intensity and more varied tone;" but in ten twin cases observed by Naegelè, jun., no variation in this sound was observed sufficient to excite suspicion of twins.

The only sign upon which reliance can be placed, is, as Dr. E. Kennedy has pointed out, the hearing the pulsation of two fœtal hearts, equally distinct, and at a distance from each other.

"Usually," says Naegelè, "the beating of one heart is heard in the left or right inferior abdominal region, while that of the other is audible in the superior abdominal region of the opposite side. But it never happens, be the position of the children what it may, that the beating of the two hearts is heard on the same horizontal plane." It is the more important to bear in mind the different situations of the two hearts, because their action is often synchronous.

CHAPTER VI.

DURATION OF PREGNANCY.

229. What is the ordinary term of gestation, and what are the deviations from it? Such are the questions to be briefly discussed in the present chapter, rather in a physiological than a medico-legal point of view; for full particulars, I refer the reader to Beck's Jurisprudence and Montgomery's Essay on the subject.

The first point to be settled is the ordinary term of utero-gestation; and we are met at the outset by the difficulty of obtaining accurate data. The common mode of calculation is from a fortnight after the last menstruation; and the period so fixed is corrected by the time at which quickening occurs. In many instances this proves pretty correct; in the majority, I think, it is rather overrun; and, at any rate, the uncertainty as to the period of conception, and the variation in the time of quickening, are sufficient to render the computation no more than an approximative estimate.

Cases, however, occasionally occur, where conception follows a single coitus, and if they were sufficiently numerous, they would settle the question; but they are rare. Dr. Montgomery relates the case of a lady who went to the seaside in June 1831, leaving her husband in town. He visited her for the first time November 10th, and returned to town the next day. She quickened on the 29th of January 1832, and was delivered August 17th, exactly two hundred and eighty days from the time of conception.

The deductions from such cases, and from general calculation, have led to fixing the term of gestation at ten *lunar* months, or nine calendar months and one week, or forty weeks, or two hundred and eighty days, allowing for some variation either way.

230. But then, allowing for the uncertainty of the ordinary data, or supposing the "*point de départ*" unquestionable, are we to conclude that the actual duration of pregnancy is determinate and invariable? We know that it may be abbreviated without destroying the child, from various causes, but then this is not the natural course. *May it also be prolonged?* So much diversity of opinion has obtained on this point, that it is very difficult to come to a satisfactory conclusion. In the celebrated Gardiner peerage case, the most eminent accoucheurs in the country were arranged on opposite sides. Drs. Gooch, R. Blegborough, Davis, Sir C. M. Clark, and Mr. Pennington, discrediting protracted gestation, and Drs. Granville, Conquest, Blundell, Merriman, Power, Hopkins, &c., advocating its possibility.

Dr. Dewees remarks, "I have had every evidence, on this side of absolute proof, that it has been prolonged to ten calendar months, as an habitual arrangement, in at least four females; that is, each went one month longer than the calculations made, from an allowance of ten or twelve days after the cessation of the last menstrual period; and from the quickening, which was fixed at four months." Professor Desormeaux relates a case of a lady whose pregnancy lasted nine months and a fortnight. The late Professor Hamilton, of Edinburgh, declares his "solemn conviction, that he has met with at least twelve cases, in the course of practice, where there could not be the shadow of doubt of the protraction of human pregnancy beyond the ordinary period." M. Valpeau has recorded nine cases of the kind.

To these authorities may be added the names of Hervey, Smellie, Zacchias, La Motte, Le Roi, Le Bas, Foderè, Capuron, Gardien, Murat, &c.

Dr. Montgomery relates two cases in his work, one of which came under my observation; in the first the gestation continued two hundred and ninety-one days, and in the second forty-one weeks and two or three days at least. I have referred to some of the cases on record, because, the question being chiefly of authority, positive evidence must infinitely outweigh mere negation.

231. An additional argument has been deduced from the irregularity of the period of gestation among cattle. According to the researches of M. Tessier: out of 160 cows, 14 calved from 8 months to 8 months and 26 days; 3 at 270 days; 50 from 270 to 280 days; 68 from 280 to 290 days; 20 at 300, and 5 at 308 days; the extremes being thus 67 days apart. Of 102 mares, 3 foaled on the 311th day; 1 on the 314th; 1 on the 325th; 1 on the 326th; 1 on the 330th; 47 from 340 to 350 days; 25 from 350 to 360; 21 from 360 to 377, and one on the 394th day; the extremes being 83 days. With sows, the extremes were 15 days; and with rabbits (out of 139 cases) 7 days.*

* Recently, Earl Spencer has communicated the results of his observations for a number of years on cows, to the English Agricultural Society. (*Journal of the English Agricultural Society*, part ii. 1839.) Of 764 cases, 314 calved before the 284th day, 310 after the 285th, and only 16 after the 295th; so that the probable period of gestation, he thinks, ought to be considered 284 or 285 days. — EDITOR.

232. In conclusion, there is no doubt that the usual period of gestation may be *anticipated* by at least two months, without necessary injury or death to the infant; and it appears to me that the evidence we possess, as well as the weight of authority, is in favour of occasional protracted gestation; and that, to use the words of Dr. Montgomery, I "cannot imagine why gestation should be the only process, connected with reproduction, for which a total exemption from any variation in its period, should be claimed." *

* Dr. James Reid, Physician to the General Lying-in-Hospital, London, has presented a series of facts calculated to throw much light upon the question of the duration of pregnancy in the human female. (*Lancet*, July 20, 1850.) He gives a summary of twenty-five cases which he has collected during the last twenty years. He states that he has every reason for relying implicitly on the statements made to him by the parties. They were either cases of single women who dated from one coïtus, or of married females, whose husbands had been absent for a considerable time before and after the last intercourse. In no one of them was there the slightest apparent reason for deception; and their small number for so long a space of time shows he had been careful to select such only as he could thoroughly depend on. The cases are as follows: —

1. Connection only July 27; parturition occurred April 30 (276 days).
2. Catamenia terminated March 14; connection only March 18 and 20; parturition December 20 (274 days).
3. Catamenia, December 13; connection immediately afterwards; quickened April 6; confined September 13 (274 days).
4. Catamenia, November 6; connection only November 18; confined August 20 (275 days).
5. Catamenia, November 7; connection only November 12; sickness commenced on December 12; confined August 12 (273 days).
6. Catamenia, January 10; connection only Febuary 2; quickened June 16; confined October 31 (271 days).
7. Connection only November 15; confined August 16 (274 days).
8. Connection only October 18; confined July 19 (274 days).
9. Catamenia, June 15; connection only July 1; confined April 5 (278 days).
10. Connection only August 5; confined April 25 (263 days).
11. Catamenia, August 4; connection only August 6; no intercourse afterwards for six weeks; confined May 13 (280 days).
12. Catamenia, August 9; connection only August 11; confined May 2 (264 days).
13. Connection only October 29; confined July 30 (274 days).
14. Catamenia, November 7; connection only November 18; confined August 21 (276 days).
15. Connection only October 8; confined July 9 (274 days).
16. Connection only April 6; confined January 7 (276 days).
17. Catamenia, August 15; connection only August 18; confined May 25 (280 days).
18. Catamenia, July 17; connection only July 22; quickened November 10; confined April 15 (266 days).
19. Catamenia, January 9; connection only January 10; confined October 2 (265 days).
20. Connection only February 11; confined November 3 (266 days).
21. Catamenia, May 14; connection only May 14; quickened September 10; confined February 10 (272 days).
22. Connection only February 28; quickened at 19th week; confined November 30 (275 days).
23. Connection only February 9; confined November 6 (271 days).
24. Catamenia, March 5; connection only March 12; sickness commenced April 14; quickened July 6; confined December 24 (287 days).
25. Catamenia, September 10; connection September 15, 16, 17; confined July 5 (292 or 293 days).

Two only of these cases, it will be observed, went beyond the term of 280 days, and it is requisite we should enter more fully into the details relating to them.

In case 24, the circumstances were as follows: A young lady, under promise of marriage, unfortunately allowed liberties which caused the usual result — pregnancy. She was then deserted by her lover, who went into the country, and she saw no more of him for a time. About eighteen months after her confinement, an imprudent female friend

But on the other hand, it must be confessed that many of the cases adduced are valueless, because founded on data which are necessarily uncertain; and I should be unwilling to admit any as conclusive, occurring in persons exposed to frequent intercourse, and calculated in the ordinary manner.

wrote to her, informing her that the father of her child was in London, and was to be at her house on the ensuing evening, but that he was to leave town on the day after. Hoping that she should be able to induce him to aid towards the maintenance of the child, she went to her friend's house at the appointed time, March 12th, and the parties having been left alone together for a time, intercourse again took place. The catamenial period had terminated a week previously, and, at the expected time of its return, she was alarmed at its absence. Morning sickness commenced April 14th, and in the beginning of June, when she called to consult Dr. Reid, there were all the well-marked signs of pregnancy. The movements of the fœtus were felt July 6th, and from there being no doubt whatever, in this case, as to the precise time of conception, Dr. R. felt much interest in watching the termination. December 17th was the day on which it was calculated, at the latest, that parturition would take place; but this event did not occur until the twenty-fourth, making the term 287 days. The parties had never met after the 12th of March.

Case 25. — A married lady, who had not borne a child for the previous five years. Her husband returned from the Continent on the evening of September 15th (five days after the lady's catamenial period), and he again left for a long journey on the morning of the 17th. All the usual signs of pregnancy occurred in October, and throughout the whole term she confidently expected to be confined about June 21st, as the date of impregnation was so well marked. Labour, however, did not commence until July 5th. Now in this case the only objection that could be offered is, as to the veracity of the data, but, says Dr. R., independently of the virtuous character of the lady, my attention would not, under other circumstances, have been so frequently directed to the precise date of her husband's departure; and, after five unproductive years, it would at least be an extraordinary coincidence, that impregnation should have been caused by another individual than the husband at this precise time. I may add, too, that of several children which the lady now has, that which was born at the period referred to certainly bears a much stronger resemblance to the husband than either of the others.

The following are cases narrated by other authors, in which the data were sufficiently determined: —

Dr. Girwood's: — The husband arrived at home May 31; the catamenia should have appeared June 2, but did not; symptoms of pregnancy soon after were evident, and parturition took place March 1 (274 days). *Lancet*, Dec. 1844.

Dr. Montgomery's: — Catamenia, October 18; impregnated November 10; one connection; quickened January 28; confined August 17 (280 days). *Exposition of Signs, &c. of Pregnancy.*

Dr. Rigby's: — Three cases of single coïtus; first, 260 days; second, 264 days; third, 276 days; fourth, 284 days. *American Journal*, Dec. 1847.

Dr. Lockwood's: — Four cases of single coïtus; first, 270 days; second, 272 days; third, 276 days; fourth, 284 days. *American Journal*, Dec. 1847.

Single connection, October 10, 1840; confined August 4, 1841 (272 days). *American Journ. Med. Sciences*, April 1842.

Case of Anderson *v.* Whitaker, 1827: — One coïtus only, January 8; confined October 28 (283 days).

Dr. Lee's: — Forty-one weeks after the departure of her husband for the East Indies (287 days). *Medical Gazette*, 1831.

Desormeaux's is a very satisfactory case. The lady was deranged, and it was thought probable, by her physicians, that pregnancy might be beneficial. The husband visited her, therefore, at intervals of three months only, so that, if conception should take place, the risk of abortion from continued intercourse might be avoided. An exact account of these visits was kept, and when conception took place they ceased. She was confined nine calendar months and a fortnight after the last visit. The exact number of days is not given, but, taking the shortest nine months (273 days), with the addition of the fourteen, there will be, at least, 287 days. *Dict. de Méd.* vol. x.

Dr. Dewees' case in Philadelphia: — One connection; delivered nine months and thirteen days after (say 286 days). In this case the catamenia appeared as usual at the proper period, one week after the intercourse.

Dr. Beatty's: — 291 days. *Dublin Med. Journ.* vol. viii.

CHAPTER VII.

STERILITY.

233. Having thus completed the history of conception and utero-gestation, we shall now consider certain abnormal deviations from the ordinary course of these functions; and the first in order is *sterility*, or inability to conceive.

The *causes* of this defect have been divided into functional and organic, into curable and incurable; into those which cause sterility, properly so called, and those which merely occasion impotence. Without adopting any special classification, I shall enumerate the organic and incurable cases first, and then the curable, whether functional or organic, with their treatment; and adding other causes, not included in either class.

Mr. Skey's case of Cæsarian operation: — One coïtus only, on April 7, 1846; labour pains commenced on January 25, 1847 (293 days).

Dr. McIlvain's, at Charlotte, North Carolina: — The lady was visited by her husband from a distance, July 1, 1847; he remained until the morning of the 6th, and did not again see his wife for nine months. Intercourse took place on the 1st, 2d, 3d, and 4th of July. Shortly after, symptoms of pregnancy appeared, but the lady was not confined until April 23, 1848, 293 days after the 4th of July (or perhaps 296 after the 1st).

Dr. Ashwell's: — Catamenia terminated January 25; husband left a few days after, and was absent six weeks. Confined November 27 (300 days after the last intercourse). There would be 258 days from his return; but the infant, Dr. Ashwell mentions, was much larger than the other children of the lady, and bore a strong resemblance to the father.

Velpeau gives a case (*Art des Accouch.*) of 310 days. At the supposed fourth month of this gestation, M. Velpeau affirms that he distinctly felt both the active and passive movements of the fœtus.

It will be seen, therefore, by the foregoing cases, that there are well-authenticated instances in which the period of gestation has been extended beyond the usual term. In the cases of *single intercourse*, 293 days form the longest period, or eighteen days beyond what is deemed to be the usual average duration of pregnancy in the human female. Now it is a coincidence with the results of Lord Spencer's tables, that of the 764 cows whose data were so accurately noted, the greatest excess beyond the average term of gestation in them (285 days) was also eighteen days. In the case related by Dr. Ashwell, the exact day of impregnation is not given; it is stated that the husband left a few days after the catamenial period, and I have put this down as six days after; but as it is the only case which extends to 300 days, some, perhaps, may doubt the exactness of the husband's statement as to time.

Velpeau's case is without dates, and rests solely on the fact of the fœtal movements being felt at the fourth month; might they not have been appreciable before that period?

With a view to ascertain the experience of those who were most likely to have paid particular attention to this subject, upwards of forty of the most eminent obstetric practitioners in London, Dublin, and Edinburgh, were applied to by Dr. Reid. The large majority of these expressed a firm conviction as to the occasional extension of the usual period of pregnancy by a few days beyond 280. Several have met with one or two cases of protracted gestation, out of many hundred, on the exact data of which they could rely; others, who had not kept notes of their cases, could not positively speak to facts, but had no moral doubt as to the period being extended in some instances. Some, who have had extensive experience in private and hospital practice, state that they have never met with an undoubted case of protracted gestation; whilst two affirm that it is their strong conviction, that no case ever exceeds the 280th day from conception, and one, that it is never carried beyond the ninth calendar month.

In order to show that no other data than the calculation from a single coïtus is to be depended upon to fix the commencement of pregnancy, Dr. Reid presents the following table, the result of 500 cases, in which the exact number of days intervening between

234. The *absence of the ovaries* will render the person incurably sterile, as will also the absence of one and disease of the other, or the disorganization of both. Cases of this kind are not infrequent. Disease of the substance of the ovary may be extended to the Graafian vesicles, or they may be congenitally deficient, and so conception be prevented. "The

the last day of menstruation and that of parturition is shown. With the exception of about 50, they were private cases, in which the data were most correctly kept; and the others were selected from upwards of 1000 hospital and dispensary cases, presenting an equal certainty as to date, in females superior to the usual class of hospital patients.

	Days.	Cases.	
37th week.	252	4	23 cases.
	253	1	
	254	3	
	255	1	
	256	2	
	257	4	
	258	4	
	259	4	
38th week.	260	6	48 cases.
	261	5	
	262	3	
	263	9	
	264	10	
	265	5	
	266	10	
39th week.	267	9	81 cases.
	268	13	
	269	5	
	270	13	
	271	12	
	272	13	
	273	16	
40th week.	274	21	131 cases.
	275	20	
	276	16	
	277	16	
	278	22	
	279	21	
	280	15	
41st week.	281	18	112 cases.
	282	25	
	283	14	
	284	15	
	285	14	
	286	15	
	287	11	

	Days.	Cases.	
42d week.	288	17	63 cases.
	289	8	
	290	9	
	291	14	
	292	6	
	293	3	
	294	6	
43d week.	295	2	28 cases.
	296	5	
	297	8	
	298	6	
	299	1	
	300	2	
	301	4	
44th week.	302	1	8 cases.
	303	1	
	304	2	
	305	1	
	306	0	
	307	1	
	308	2	
45th week.	309	0	6 cases.
	310	1	
	311	1	
	314	1	
	315	2	
	316	1	

Total, 500 cases.

In the case which occurred 314 days after the cessation of the catamenia, it is noted that quickening did not happen until the 6th month, proving, in Dr. Reid's opinion, that conception had taken place later than had been thought. Had minute investigation been made, at an early period, into the remaining five cases which went beyond the 44th week, it is most likely that similar facts might have been observed.

It will be seen that the above table agrees with that of Dr. Merriman (114 cases), in showing that the greatest proportion of women complete the period of gestation in the 40th week after the cessation of the catamenia, and a very considerable number in the 41st week.

In Dr. Murphy's table of 182 cases, the numbers born in the 39th and 40th weeks were about equal, being 24 and 25: whilst the greater proportion (*thirty-two*) were in the 41st week, and 25 in the 42d week — equal to those in the 40th.

In Dr. Reid's table, given above, the 282d day was that on which the largest actual proportion of the patients were delivered; but the number from the 274th to the 282d

most frequent variety of ovarian disease," says Dr. Davis, in his Obstetric Medicine, "which we may suppose calculated to produce this effect, is that of an obviously morbid enlargement of the vesiculæ Graafianæ, accompanied by a degenerated structural condition of their parieties."

235. The *fallopian tubes* may be congenitally deficient or imperforate, though such cases are extremely rare. Their canal may be obliterated from acute or chronic inflammation, or their fimbriated extremities may become adherent to the ovaries. Even though not imperforate, yet the canal may be filled with adventitious matter. In all these cases, sterility is the consequence, because the access of the spermatozoa to the ovary is prevented.

236. The *uterus* may be absent, of which numerous cases are recorded. If present, its cavity may be partially or wholly obliterated, as was noticed by Morgagni, Baillie, and Mott; these cases are of course incurable. The canal of the cervix may be impervious, or its mouth covered by membrane, as in Delpech's case and several others; but though sterility results so long as it continues, it is within reach of treatment, and has been cured by puncturing.

Diseases of the uterus, such as carcinoma, polypus, prolapsus, &c. are enumerated among the causes of sterility, but erroneously, I think. Madame Lachapelle, Dr. Davis, and others, have related cases of conception and delivery notwithstanding the existence of scirrhus and even open cancer.

M. Chopart mentions a case of complete prolapse, which proved no bar either to intercourse or conception. Many cases of polypus discovered during labour or causing abortion, have been met with; two occurred to myself a short time ago.

Inversion of course involves sterility; and the same may be said when the cavity of the uterus is occupied by fluid or solid matters, and the os uteri closed, as in physometra, hydrometra, moles, &c.; but these belong to the curable causes.

237. The *vagina* may be absent, imperforate, or partially adherent. Some of these cases are curable by careful incision and separation, as in Dr. Physic and M. Amussat's cases. Again, it may be the seat of callosities, cicatrices, tumours, &c. and by them be partially closed, offering an obstruction to copulation; but they also may generally be relieved by an operation. Extreme narrowness of the canal is seldom the cause of impotence, as it is generally overcome; but extreme shortness is considered as occasionally an incurable cause, though I rather think without sufficient reason, as, though short, it may not be sexually disproportionate. Closure of the orifice of the vagina by membrane, is an effectual impediment to coition, and until removed, to conception; but partial closure may admit of conception. A short time ago I attended a lady in her confinement, in whom the hymen was perfect, the perforation barely ad-

day ran so near to each other that we must rather take that as the average period. If we allow a range of from two to six days after menstruation, as elapsing probably before conception takes place, it will then appear that about the 39th week after impregnation is most probably the ordinary duration of pregnancy; and this will coincide with the result of the table taken from cases of single coïtus.

In a note to a former edition of this work, Dr. Huston states that he has known at least two instances in which he had the strongest reasons for believing that it extended, in one case two weeks, and in the other three weeks, beyond the usual period, or nine calendar months. — Editor.

mitting the tip of my finger, and the membrane was strong enough to resist the pressure of the head for a considerable time.

238. The variety of *dysmenorrhœa* in which lymph is secreted, is considered by Denman and others to preclude conception; this, however, is not universally the case, and the disease in many cases is curable.

Congestion, erosion or ulceration of the cervix uteri, uterine leucorrhœa when excessive, and perhaps vaginal leucorrhœa, may also be included among the curable causes of sterility. The same result obtains temporarily, in cases of irritable uterus and some diseases of other organs. Mr. Whitehead has lately suggested that the uterine mucus, instead of being alkaline, as in its healthy state, may be rendered acid by certain affections of the uterus, and as the researches of M. Donnè have shown that spermatozoa lose their vitality sooner in acid mucus, this may be a frequent cause of sterility.*

Unsuitable marriages, whether as to disparity of age or constitution, often prove unfruitful: cases are on record of parties who together were sterile, being both fruitful with other individuals.

Excessive sexual indulgence often defeats its object.

239. I have thus cursorily noticed most if not all the appreciable causes of impotence and sterility in the female, with a slight sketch of the treatment of such as are remediable.

There is, however, a considerable class of unfruitful marriages of which no explanation can be given; we can only conjecture, that the ovaries or fallopian tubes are defective, or that some sexual incompatibility exists.

The uterus and vagina are within reach of an examination, and their condition can be minutely ascertained by means of the finger, the speculum, and bougies.†

* On Abortion and Sterility, p. 406.

† In a paper read before the Westminster Medical Society, April 1849, Dr. Tilt, after dividing the causes of sterility into those which are self-evident, those which are disputable, and those which are of a mysterious nature, directed the attention of the Society to subacute ovaritis as a frequent cause of sterility.

He pointed out the paramount importance of the ovaries in the female organism, and their influence over all the functions of reproduction: he showed that the anatomical phenomena of ovulation are identical with those termed inflammatory, and hence inferred, that in morbid ovulation the healthy process might often pass into the inflammatory, which would furnish a satisfactory explanation of the increase of pains and of heat in the ovarian regions,—symptoms so frequently met with in difficult menstruation. He considered that subacute inflammation of the ovaries might produce all those symptoms which are called by the common name of dysmenorrhœa, although they may also depend on the disorder of other organs. He also admitted, that the symptoms of subacute ovaritis might vary according to the nature of the patient's constitution, producing hysterical symptoms in nervous and highly excitable females, and morbid products and sterility in those of a strumous constitution.

Dr. Tilt proved, by the testimony of authors, the frequency of unaccounted-for ovarian lesions; and as these lesions are admitted by all to be the products of inflammation, he drew from this, as an evident conclusion, that the ovaries and their peritoneal covering were frequently subjected to inflammation, though not recognized as such during the patient's life, nor treated accordingly. Respecting the production of dysmenorrhœa, Dr. Tilt admitted that while, in some instances, all the symptoms of that disease were produced by subacute ovaritis; in others, as has been well established by Dr. Oldham, ovaritis determines dysmenorrhœa by the inflammatory congestion of the uterus to which it gives rise; but he did not agree with Dr. Rigby that membraniform exudations in the catamenia were always the proof of ovaritis. Having thus established that subacute ovaritis is a frequent cause of dysmenorrhœa, Dr. Tilt observed, that dysmenorrhœa and sterility being admitted as concomitant facts, depending on each, or on the same

CHAPTER VIII.

SUPERFŒTATION.

240. The term Superfœtation has been applied to those cases of abnormal conception in which a female, already pregnant, has been supposed to conceive a second time before the termination of the first gestation. The belief in the possibility of such an occurrence is universal among the older writers, and cases are adduced in support of the opinion, but modern writers have been more divided in opinion; it is denied by Hebenstreit, Ludwig, Nutger, Schmidtmüller, Blumenbach, Beck, &c.; but admitted by Haller, Hervey, Ploucquet, Barzelotti, Velpeau, Buming, &c.

241. The cases alluded to are such as the following:—1. It is not uncommon for women to be delivered of a full-grown child and a blighted ovum at the same time, and from the disparity between them, it has been assumed that the period of conception was different for each.

2. Again, a woman may be delivered of two living children at one birth, or within a few hours of each other, one of which may be fully developed while the other appears immature.

3. Further, the same woman has given birth to twins of different colour, as in the case related by Buffon, and quoted by Foderè and all recent writers on the subject, of a woman at Charleston, South Carolina, who was delivered in 1714 of twins, within a very short time of each other, the one being black, the other white. On examination, the woman confessed that on a certain day, immediately after her husband left her, a negro entered her room, and by threatening to murder her in case of refusal, obtained connexion with her.

Dr. Mosely, in his work on tropical diseases, p. 111, mentions a similar case:—"A negro woman brought forth two children at a birth, both of a size, one of which was a negro, the other a mulatto. On being interro-

cause, he had a right to infer that subacute ovaritis was a cause of sterility, and that this imperfection was the result—

1. Of morbid lesions of the stroma, or of the vesicles of the ovula therein contained.
2. Of a false membranous deposit lining the ovaries, so as to preclude the exit of the ovula.
3. Of lesions in the tubes destined to convey the ovula to their uterine abode. He likewise stated that sterility was sometimes produced by the uterine extremities of these tubes being blocked up by a glutinous deposit.

In concluding the enumeration of morbid lesions, Dr. Tilt remarked, that as our acquaintance with the physiology of the ovaries dates only from yesterday, we need not be surprised if the knowledge of their pathology is also in an embryotic state.

Dr. Tilt concluded by giving the history of three cases in which the diagnosis of the disease was fully confirmed, by an accurate examination of the patient through the rectum, and wherein the treatment recommended brought on a cessation of the sterility after it had lasted five, six, and seven years. The remedial measures prescribed were, leeches, to diminish the chronic ovarian congestion; blisters, to break the chain of morbid nervous action, fostered by long habits of suffering; mercurial ointment, combined with narcotic extracts and camphor, to reduce pain and vascular action; medicated enemata were also administered with the same intention.

The views advanced by Dr. Tilt in the paper referred to, are more fully developed, and illustrated by a more extended series of observations, in a treatise which that gentleman has recently published on "Diseases of Menstruation, and Ovarian Inflammation, in connection with Sterility, Pelvic Tumours, and Affections of the Womb."—Editor.

gated upon the cause of their dissimilitude, she said she perfectly well knew the cause of it, which was, that a white man belonging to the estate came to her hut one morning before she was up, and she suffered his embraces almost instantly after her black husband had quitted her." Cases of the same kind have been published by M. de Bouillon, Drs. Dewees, Trotti, Guerarde, Delmas, Dunglison, &c.

4. Lastly, cases have occurred where the birth of a mature child was succeeded, after the lapse of some months, by the birth of another. Several such cases might be cited. In the *Recueil de la Société d'Emulation*, there is one of M. A. Bigaud, of Strasburg, æt. thirty-seven, who was delivered of a lively child on the 30th of April. The lochia and milk were soon suppressed. On the 17th of September of the same year (*i. e.* about four and a half months after the first delivery) she brought forth a second apparently mature and healthy child. On the death of the woman the uterus was found to be single.

In the case related by Desgranges, of Lyons, the woman was delivered on the 20th of January 1780, of a seven-months child; and on July 6th, 1780, five months and sixteen days after the former birth, she gave birth to a second, which had apparently reached its full time.

The late Dr. Maton published a similar case in vol. iv. of the Trans. of the College of Physicians, London. Mrs. T., an Italian lady, but married to an Englishman, was delivered of a male child at Palermo, November 12, 1807. On the 2d of February 1808, not quite three calendar months after the preceding accouchement, she was delivered of a second male infant. Dr. Maton assured Dr. Paris that "both the children were born perfect; the first, therefore, could not have been a six-months child." Other cases may be found quoted by Beck, Velpeau, and Cuming.

242. Upon the strength of these cases, it is assumed that a second impregnation may be effected, although the uterus be occupied by the results of a previous conception. Our first object is therefore to ascertain how far the cases considered in themselves warrant such a conclusion, and then whether, if the cases are not otherwise explicable, we are bound to adopt this theory as the true explanation. First, then, I would observe that the first and second class of cases can be easily explained without having recourse to the doctrine of superfœtation at all. When twins are conceived from one intercourse, it not unfrequently happens that one ovum is blighted, and sometimes rejected, sometimes retained, and occasionally the appearance of the ovum when subsequently expelled will be found to correspond to the period of pregnancy, at which symptoms of uterine disturbance and threatened abortion appeared. Again, nothing is more common in twin pregnancy, than to find one more fully grown than the other, and nothing more easily explained. So that neither of these cases are any support to the doctrine, because they are susceptible of another and more simple explanation.

The third class, where children of different colours are brought forth, is equally unavailable, for, at the utmost, they only prove that a double conception may occur from connexion with two individuals, if such intercourse take place with a very short interval. If such cases occurred with an interval of four or five months between the birth of the children, the case would be altered; but I am not aware of any such on record.

It must be confessed that the fourth class of cases is very difficult of explanation, and they are the only ones of any force in support of the theory. It has been supposed, that in such cases, both children were begotten at the same moment, but that the tardy birth of the latter was owing to its slower development: but this explanation requires previous proof that a slow growth of the fœtus involves a protracted gestation.

Another explanation has been proposed, based on the fact, that when pregnancy has occurred with a double uterus, one cornu only is occupied by the child. It may in such cases be possible (so it is argued) for the woman to conceive a second time, and the child to occupy the vacant cornu, although previously pregnant; and in support of this view, a case is adduced which occurred to Mad. Boivin, and which is related in M. Cassan's thesis "On double Uterus and Superfœtation." "On the 15th of March, 1810, a woman, aged forty, gave birth to a female infant, weighing about four pounds. As the abdomen still remained bulky, Madame Boivin introduced her hand, but could find nothing in the uterus. But the examination led her to suspect that there was another fœtus, either extra-uterine, or contained in a second cavity in the womb. At length, on the 12th of May, a second female infant was born, weighing not more than about three pounds, feeble, and scarcely able to respire. The mother assured Madame Boivin that she had had no connexion with her husband, (from whom she had been some time separated,) except thrice in two months, viz., on the 15th and 20th of July 1809, and on the 16th of September following." In this case there can be little doubt of the existence of a double uterus, and it would be difficult to disprove that the second child was not the fruit of the last conception, and, if so, a clear case of superfœtation; but, even granting so much, it only proves the possibility of such an event when the uterus is double, and it would not only be very bad logic to assume that the uterus was double in all cases when two children are born at considerable intervals; but it would be inconsistent with facts, for it is expressly stated that in the case of M. A. Bigaud, already quoted, the uterus was found, after her death, to be single.

243. Thus, whilst we need not deny that a double uterus may afford an opportunity for a double conception, at distant periods, we cannot admit one such case as explaining all the cases of that kind on record; and with respect to such, we have made no advance towards an explanation. Admitting this, are we necessarily to adopt the hypothesis of superfœtation? I think not, because the real difficulties of such a theory appear insurmountable; and if so, our ignoaance of the true explanation is no argument for the adoption of a false one. The physical difficulties are those which depend on the changes induced by impregnation. The reader will find that it was stated (§ 160) that shortly after conception, the uterus is lined by the deciduous membrane, a shut sac, closely adherent to the lining membrane of the uterus throughout, and covering the orifices of the os uteri and of the Fallopian tubes; that the canal of the cervix uteri is, during pregnancy, plugged with thick tenacious mucus secreted by the glands. Now if this be the case, and if it be an essential condition of generation (§ 143) that the spermatozoa pass through the fallopian tubes to the ovaries, it is evident that the theory of superfœtation involves so much apparent physical impossibility, that it must be rejected, unless it can be shown how the spermatozoa can obtain access to the ovaries when the uterus is (as it were) hermetically closed.

In coming to this conclusion, I must honestly confess that I have no better explanation to offer of such cases as Dr. Maton's; but surely it is more philosophical to acknowledge our ignorance and patiently to wait for additional information, than in our impatience of a state of uncertainty, to adopt a theory involving such difficulties.

244. In conclusion, I would say, 1. That the theory of superfœtation is *unnecessary* to explain the birth of a mature fœtus and blighted ovum; of a mature and immature fœtus, born together or within a month of each other; or of fœtuses of different colours, as they may reasonably be supposed to be the product of one act of generation, or of two nearly contemporaneous. 2. That in cases of double uterus, it is possible for a second conception to take place, and (judging from the subsequent birth of the second child, in the only case on record) at a later period than the first. 3. That in the remaining cases, where one mature child succeeded the birth of another after a considerable interval, we have no proof of a double uterus in any, and positive proof that in one case it was single, and that to the explanation of these cases, no theory, as yet advanced, is adequate; that of superfœtation being opposed by physical difficulties, which are insurmountable in the present state of our knowledge

---

CHAPTER IX.

EXTRA-UTERINE PREGNANCY.

245. From certain causes, with which we are but partially acquainted, it sometimes happens that the ovum, instead of passing into the fimbriated extremity of the fallopian tube on the bursting of the Graafian vesicle, and being thence transferred into the uterine cavity, in the gradual manner already described, is arrested in some part of its progress, where an effort is made to supply the place of the uterus, and afford space and nutrition for the fœtus. This, however, can only be partially successful, and the fœtus ultimately perishes for want of nourishment. To this misplaced gestation various names have been given, — "Extra-uterine pregnancy," "Conceptio vitiosa," "Grossesse contre nature," "Exfœtation," &c.

This abnormal deviation from ordinary gestation was known, but not minutely, to the ancients. Albucasis relates a case of fœtal bones being extracted from an abscess, which had formed near the umbilicus, and similar examples were recorded by Cornac, F. Plater, Cordæus, Horstius, Primrose, Hildanus, Riolan, jun., &c. In more modern times very numerous and well-authenticated cases have been published, and have been carefully collected and referred to by Dr. Campbell in his learned essay on this subject, to which I have been principally indebted for this chapter; and if I need any excuse for the freedom with which I have availed myself of his labours, it must be found in the fact, that his assiduity in collecting, and care in referring to the numerous cases on record, as well as the accuracy of his reasoning and the excellence of his practical recommendations, have left little or nothing for me to do but to follow in his steps.

246. All the varieties of extra-uterine pregnancy may be reduced to three:

1. *Ovarian fœtation*, when the ovum is detained in the ovary: 2. *Tubular fœtation*, when the fallopian tube is the seat of the arrest; and, 3. *Interstitial fœtation*, when the ovum enters the parieties of the uterus, but is detained in an interspace of the fibres before it arrives in the uterine cavity.

Dr. Campbell has added another variety, which he calls the *ovario-tubal*, a compound of the two first, when the sac containing the fœtus is formed by the ovary and fallopian tube jointly. A fifth species, *ventral fœtation*, is enumerated by most authors, where the ovum is found in the abdominal cavity; but I think Dr. Campbell is right in supposing such cases to have originally belonged to one or other variety previously mentioned, and for which a separate section is scarcely necessary.

A brief notice of each variety, with the details of a case or two, will be necessary before considering the symptoms and termination, &c. For reference to cases, I beg to refer the reader to Dr. Campbell's book.

247. 1. Ovarian fœtation. — By some writers the existence of this species of extra-uterine gestation is considered as rather doubtful, on account of the facility afforded for the escape of the ovum after the rupture of the Graafian vesicle; but the evidence of facts is too strong to be resisted.

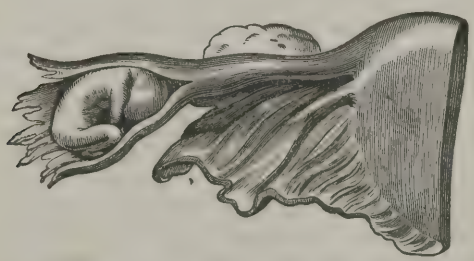
The earliest example on record is to be found in the Philos. Trans. vol. ii. p. 650, communicated by the Abbé de la Roque. It occurred in 1682: the right ovary was enlarged to the size of a hen's egg, and lacerated through its whole length. The fœtus was found in the abdominal cavity, in the midst of a large quantity of blood.

The following instance I quote from Dr. Campbell; it occurred in the practice of Dr. Granville, and, from his high character, no doubt can be entertained of its accuracy. "The subject of the case was a lady, æt. 39, the mother of seven children. Until Dec. 1818, when she conceived, the catamenia were regular; and from this period till June 9, 1829, the time of her decease, she experienced various and severe sufferings, and there were occasional discharges of a colourless fluid 'per vaginam.' After death a considerable tumour, soft and moveable, was perceived immediately above the pubes, and rather to the left of the linea alba. On reflecting the abdominal parietes, blood to the amount of several pounds was observed to fill every space which the viscera did not occupy. The tumour alluded to was about four times the size of a hen's egg; and displayed the same general black-reddish hue of all the ambient parts. A blood-vessel, the size of a large crow-quill, which penetrated the dense portion of the tumour, was traced upwards to the descending aorta, and was ascertained to be a branch of the left spermatic. A smaller and much shorter vessel arising from the tumour, was also found to communicate with the spermatic vein, thus establishing a complete circulation to and from the parts. The inferior and left half of the tumour presented a surface, consisting at two or three points of diaphanous membranes, through which a fœtus of about four month's growth was readily discovered. The left ovarium was the seat of the tumour, which, as it gradually enlarged, distended the tunics of that organ in the same progressive manner, in a ratio with its own size. As the fœtus, however, increased further, the

ovarium burst in three places; and thus the membranous sac forming the tumour partially protruded into the abdominal cavity. During this destructive process, that part of the parietes of the ovarium to which the placenta was attached was also lacerated, so as to tear the adhesion of the mass, thereby producing sudden and fatal hemorrhage. The right ovary was sound."

248. 2. Tubal fœtation.—When the arrest of the progress of the embryo takes place at the fimbriated extremity of the fallopian tube, we frequently find that the ovary forms part of the walls of the cyst in which the fœtus is contained, though it is not always easy to point out the exact locality of the arrest. "In some instances," says Dr. Campbell, "it may be presumed that in the incipient stages of gestation, the ovulum is connected with only one of these appendages, either the ovary or the tube; and that the second organ, whether ovary or tube, becomes involved merely in consequence of its state of activity, its progressive enlargement, and the pressure exerted by the ovum, together with the consequent morbid excitement." Such cases constitute the "ovario-tubal gestation" of this author, and to this class he conceives to belong those which have been recorded as examples of "ventral fœtation."

Fig. 71.



249. But of all the varieties of extra-uterine gestation, that where the embryo is contained in the tube itself, is the most frequent. Riolan published the first well-attested example, and he was followed by Littre, Sanctorinus, Poteau, &c., &c. The following example is taken from the Transactions of a Society for the improvement of Medical and Surgical Knowledge, vol. i. p. 216. "A married woman in her second pregnancy, in consequence of a bilious complaint to which she had formerly been subject, used some remedies she had been wont to employ, and also a warm bath. She had been obstructed but one period, and paid so little attention to this circumstance, that she did not make it known, either to her husband or to the ordinary medical attendant. On May 13, 1791, the morning subsequent to her having used the bath, she was suddenly seized, without any previous exertion, with a violent pain in the lower part of the abdomen, followed by syncope, from which she soon recovered. A moderate bleeding and an opiate diminished, but did not entirely subdue, the pain, which now attacked the loins as well as the abdomen, and recurred in violent paroxysms, accompanied by vomiting, yawning, and fainting. On the 16th she was somewhat easier; but towards evening there was an aggravation of her sufferings, accompanied by cold sweats,

coldness of the lower extremities, interrupted articulation, great restlessness, with want of pulsation at the wrist, and she expired.

"*Autopsy.*—Nearly a gallon of blood was found effused into the abdominal cavity, a laceration of an inch and a half in length about the middle of the right fallopian tube; an embryo of the sixth or seventh week in the blood; the uterus lined with decidua, and its cavity filled up with gelatinous matter."

I cannot but notice in this place two cases published by Dr. R. Lee, in Med. Gazette, vol. xxvi. p. 436, because of the peculiarity of the situation of the membrana decidua:—"A lady died suddenly in 1829, from internal hemorrhage, produced by rupture of the right fallopian tube, which contained an ovum. On opening the tube, and examining the different parts of the ovum, I found a deciduous membrane everywhere surrounding the chorion, and closely adhering to the inner surface of the tube, as the decidua usually does to the lining membrane of the uterus in ordinary gestation. Within the decidua the chorion, placenta, amnion, and embryo were distinctly seen." Again, "on the 18th July, 1836, Mrs. K——, after suffering some time with symptoms of inflammation and retroversion of the uterus, was seized with great faintness, and soon expired. A large quantity of fluid blood was found in the abdominal cavity, and the right fallopian tube was extensively lacerated near its fimbriated extremity. On removing the uterus and its appendages from the body, and carefully examining the ovum contained in the right fallopian tube, it was evident that a deciduous membrane everywhere surrounded the chorion, and adhered to the inner surface of the tube. The uterus was considerably enlarged, and its inner surface was coated with a very thick layer of yellowish-white soft substance, like common adipose matter, and bearing no resemblance to the deciduous membrane. There was no trace of any arterial or venous canal, in this coating."

250. 3. Interstitial fœtation.—This form is the rarest of the three or five; but the following case leaves not a doubt of its existence. It occurred in the practice of the late Mr. Hey of Leeds, and by him was communicated to Dr. W. Hunter. "The patient, aged 35, of a healthy constitution, was seized when two months advanced in her second gestation, with pains resembling colic, which were subdued by appropriate remedies: but in the sixth month, they returned with much greater violence, and were more diffused than formerly." They were repeatedly alleviated, but as frequently returned. When the term of gestation was completed, the movements of the child ceased. Pains came on, but with little effect, and vomiting, which produced great emaciation, and ultimately proved fatal. "*Dissection* exhibited adhesions between the omentum, intestines, peritoneum, and a large peculiar sac, which occupied nearly the whole abdominal cavity. Besides a well-formed fœtus, free from any mark of decomposition, the cyst, which was a line and a half in thickness, contained a quantity of chocolate-coloured fluid and some purulent-looking matter. The umbilical cord passed from the fœtus through a narrow aperture into a cavity whose walls were an inch and a half in thickness, but of much smaller dimensions than that which contained the fœtus. This smaller cyst, which must have been the uterus, contained a placenta of a size so unusual, that it filled three-fourths of the cavity of the organ; both together weighed two pounds and a half avoir-

dupois. No trace of cicatrix could be detected in the uterine parietes. The membrane of the ovum, after lining the uterine cavity, was reflected to form the inner lining of the cyst which lodged the fœtus."

251. *Causes.* — After the instances I have quoted in illustration of each variety, we may now proceed to inquire as to the causes of extra-uterine gestation, which, however, are by no means easy of discovery. It is possible that either congenital malformation or pathological changes may retain the fecundated germ in the ovary, or prevent its entrance into the fallopian tube, or arrest its progress after its entrance. Narrowness or obliteration of the tube may effect this.

In addition, interstitial fœtation has been attributed to narrowness of the uterine orifice of the fallopian tube, or an unusually large interspace between the fibres, or to a partially cornuated uterus.

But these causes, it is evident, are mainly conjectures.*

252. *Symptoms.* — The symptoms vary a good deal. So long as the part in which the embryo is lodged can accommodate it, there may be but little disturbance, and nothing to afford grounds for a correct diagnosis. In other cases, the local symptoms resemble those in disease of the uterus or ovaries. In the greater number of cases, there is much suffering from an early period. Certain of the signs of pregnancy may be present, but a degree of irregularity in their intensity will frequently be observed. Thus the catamenia may be present or absent, and if present either scanty or profuse; and not seldom there is hemorrhage, or a discharge of clots, which have been mistaken for portions of the placenta. The mammary sympathies are excited in most cases, and the changes in the areola take place. The patient may or may not suffer from nausea or vomiting, and in some cases at an early period the fœtal movements have been felt by the patient. The increase of the abdomen generally differs from that in ordinary pregnancy, being more to one side, and the pain or uneasiness may be limited to the spot where the tumour is felt. M. Chaussier lays great stress upon a sense of weight and uneasiness, deeply seated in the pelvis, and occasionally extending to the kidneys.

An examination per vaginam reveals a great deviation from the state of the organs in ordinary gestation. The os uteri may be high or depressed, but it is very seldom drawn out or dilated; in fact, it is generally as it was before impregnation, or nearly so.

* Velpeau seems to think that occasionally too great density, or preternatural thickness of the covering of the ovule, or envelope of the ovary, may detain the ovum and prevent its entering the fallopian tube at the proper time, and thus become the cause of extra-uterine pregnancy; and likewise various pathological conditions of the tube, as paralysis, spasm, excision, or insufficient length, engorgement, contraction, or inflammation and ulceration of its mucous membrane, &c. Astruc believed that unmarried women were more liable to this accident than others, and it is supposed to be caused by fear or other strong mental emotions, of which two striking instances are mentioned by MM. Lallemand and Baudelocque, in which it seemed to be caused by fright. Dr. Rigby very properly observes on this subject, that "it must always remain a matter of great obscurity as to the immediate causes of extra-uterine pregnancy, more especially of the ovarian and ventral species; and the more so as we are still ignorant of the mechanism by which the fimbriated extremity of the fallopian tube grasps the ovary immediately over the impregnated vesicle of De Graef at the moment of conception. In many cases we are inclined to believe that this function of the fallopian tube is destroyed by adhesion between it and the ovary, a circumstance of not uncommon occurrence; but from the alteration in the shape and size of these parts, as also from extensive adhesions which are usually found after death in such cases, it will ever be difficult, and perhaps impossible to prove it." — Editor.

253. When the cyst in which the ovum is contained bursts, however, a series of new and alarming symptoms are superadded. The patient complains of great uneasiness or pain suddenly occurring, languor, debility, and exhaustion to an extreme degree; there is sometimes a sanguineous discharge from the vagina, with dysuria, tenesmus, irritable stomach, &c.; in short the patient exhibits the symptoms of collapse from loss of blood.

In tubal fœtation, these symptoms generally come on more suddenly than in the other varieties, so as at once to excite suspicion of a rupture of some internal organ having taken place.

In interstitial fœtation, the symptoms are a modification of those in the other varieties. In some, there are abdominal pains and sanguineous discharges, in others these are absent; but in all the cases on record the tumefaction and fœtal movement were confined to one side of the abdomen. It is also remarkable, that in all, the child appears to have lived to the term of utero-gestation.

254. I have already stated that matters may go on more or less quietly for some time, not without injury to the health of the mother, but without danger to her life. However, the crisis must come sooner or later, when the cyst gives way and symptoms of collapse set in, followed by those of inflammation. This crisis may be hastened by various circumstances, such as violent action of the abdominal muscles, and the consequent pressure upon the tumour, sudden shocks, or blows upon the abdomen, coughing, vomiting, &c. The rupture of the cyst may be followed shortly by fatal results, owing to the shock to the system, the hemorrhage, subsequent inflammation, or from one or more of these consequences combined.

255. But there are many exceptions to such prompt terminations. The patient may survive the shock, hemorrhage, and subsequent inflammation, and the parts may accommodate themselves to the presence of the fœtus, so that the patient will recover a certain amount of health, and suffer but little local inconvenience; nay, she may even again conceive and bear children; "nine women conceived *once* during the retention of the extra-uterine fœtus; two *twice;* one *three* times; one *four* times; one *six* times, and one *seven* times."

The period during which the fœtus may be retained before the mother's death or its own expulsion varies much. Dr. Campbell gives the following account of seventy-five cases: it was retained "three months in two instances; four months in one; five months in one; nine months in two; fifteen months in three; sixteen months in two; seventeen months in two; eighteen months in seven; one year in five; two years in eight; three years in seven; four years in four; five years in one; six years in two; seven years in three; nine years in one; ten years in three; eleven years in two; thirteen years in one; fourteen years in two; sixteen years in one; twenty-one years in one; twenty-two years in one; twenty-six years in two; twenty-eight years in one; thirty-one years in one; thirty-two years in one; thirty-three years in one; thirty-five years in two; forty-eight years in one; fifty years in one; fifty-two years in one; fifty-five years in one, and fifty-six years in one case."

These cases afford a striking instance of the power of the human frame to adapt itself to new and apparently adverse circumstances. In many cases, after some time, an effort is made to get rid of the foreign body by artificial openings; thus the fœtus may be passed piecemeal through the

abdominal parietes, the colon, rectum, or vagina. In some rare cases, fœtal bones have made their way into the bladder.

256. Experience alone could have convinced us of the possibility of the fœtus living in these misplaced gestations; yet it may continue to draw nourishment and exist for any period within the full term of gestation. "In ninety-eight cases," says Dr. Campbell, "in which we can decide, or nearly so, on the stage of pregnancy, the fœtus in seventy-nine patients died at the close of nine months, or soon thereafter; one in the eighth; seven about the seventh; one in the sixth; two in the fifth; two in the fourth; five in the third, and one at the end of the first month."

The development during the life of the fœtus appears to proceed at the ordinary ratio, and subject to the laws of normal gestation; the placenta, cord, and membranes are obvious before decomposition takes place; but the placenta is generally thinner than usual. Authors have differed as to whether the ovum receives an additional covering or not, analogous to the decidua; but the evidence adduced by Dr. Campbell and Dr. R. Lee's recent researches seem conclusive in the affirmative, and it is probable that this membrane, which closely resembles the decidua, may perform an office similar in the nutrition of the fœtus. The part to which the placenta is attached, receives an increased vascular supply for the occasion.

Almost all writers have described the uterus in these cases as lined with (so called) deciduous membrane, though in some cases much hypertrophied; but in one of Dr. Lee's cases it was absent, and he doubts, whether when present, it possesses "an organised vascular structure, similar to that of the true decidua."

257. *Treatment.*—If we are satisfied of the nature of the case, the first indication is to prevent or postpone the laceration of the cyst in which the ovum is contained, and which so often proves fatal. With this view, undue exertion of every kind is to be avoided, and all circumstances likely to excite uterine irritation. No pressure should be made upon the tumour, and any uneasiness in it should be allayed as promptly as possible by venæsections, leeches, or opium.

When the rupture takes place, marked by the sudden giving way, collapse, and exhaustion, &c., the second indication is to moderate the effusion and support the strength, for which purpose the patient should be placed on a hard bed, with her head low, and the abdomen firmly compressed by a binder, over which cold should be applied by means of pounded ice in a bladder.

Acetate of lead may be of service, with suitable stimulants and broths.

Should we succeed in relieving the state of collapse, we must next combat the inflammation which will set in, by the abstraction of blood, calomel and opium, blisters, &c.

As the child dies soon after the rupture of the cyst in most cases, we must next endeavour, by quietness and the absence of excitement and irritation, to aid the natural powers in accommodating themselves to the new circumstances of the case. The bowels must be kept free by gentle laxatives, and any renewal of the pain must be met by the application of a few leeches or an anodyne.

If we find after a time that any effort is made to remove the fœtus by the formation of an abscess or fistulous communication and discharge of

fœtal bones, it may in some cases be advisable to assist the process by enlarging the opening in the abdominal, vaginal, or rectal parietes; but this should be done with great judgment and care, as serious hemorrhage may ensue, and we are never to forget that nature is generally competent to complete the processes she commences.

Any subsequent inflammation must of course be treated in the usual manner.

CHAPTER X.

PATHOLOGY OF THE FŒTUS.—SIGNS OF ITS DEATH.

258. When describing the contents of the gravid uterus, a short notice of the principal pathological changes to which they are exposed was appended, so that I need not recapitulate them here. They, however, with the diseases to which the fœtus is obnoxious, constitute an important deviation from normal gestation. The latter remain for notice at present.

Abundant observation has proved, that the fœtus is liable to almost all the forms of disease which attack the child; that many of them are quite independent of the maternal state; but that in addition it may be affected secondarily through her. Amongst the examples of the latter, must be classed those cases of premature births which occur during epidemics, and where the fœtus appears to have participated in the disease of the mother, as in the observations of Rœderer, Wägler, Schmurrer, and Russell. I have observed a considerable quickening of the action of the fœtal heart, some days after pregnant women have been attacked with fever.

According to Duettel, Schweig, Zurmeyer, &c. children born of mothers suffering under *intermittent fever* have exhibited the same disease immediately after birth.

Many cases have been recorded by Hildanus, Bartholinus, Möllenbroccius, and, in later times, by Van Swieten, Mead, Baker, Lynn, Jenner, &c. of children born with *small-pox*. *Measles* have also been observed in new-born infants by Osiander, Stark, Girtanner, Orfila, &c. Nor are they exempt from other diseases of the skin, as *erythema*, *strophilus*, *pemphigus*, &c.

259. There is scarcely any internal organ which has not been observed to be the seat of inflammation. The presence of *hydrocephalus* is the result of inflammation (acute or chronic) of the arachnoid. Hoogween, Veron, and Cruveilhier have recorded cases of *pleurisy*. Mende and Koelpin have observed *abscesses* of the lungs; Zierhold *œdema*, and Wrisberg *scirrhous* induration; Husson, Chaussier, and Billard have discovered *tubercles*, Cruveilhier *lobular pneumonia*, and Lobstein *calcareous deposition* in these organs. Brachet, Chaussier, Dugès, Billard, Carus, Simpson, &c. have observed cases of *peritonitis*, Chaussier of *enteritis*, &c.

Of the cause of such attacks we know little or nothing.

260. Chronic diseases are even more numerous: the fœtus may suffer from a general *hypertrophy* or *atrophy;* may be attacked with various

forms of *syphilitic disease;* may labour under *worms*, *calculus*, *dropsy*, *jaundice*, or *hernia*, and the pancreas, liver, or kidneys may exhibit organic or pathological changes.

The bones and joints are not unfrequently diseased; thus, for instance, children are born with *rickets*, as related by Osiander, Carus, Otto, and others; with *caries*, as observed by Carus and Joerg; or *necrosis*, as in M. Billard's case. Numerous cases of fractures and dislocations of different bones are on record.

261. This brief and imperfect sketch will suffice to prove the truth of the statement made at its commencement, that the fœtus does not enjoy an exemption from disease whilst "in utero;" unfortunately we possess neither the means of detecting nor of curing these affections. The subject is nevertheless one of great interest: to enable any of my readers to pursue the investigation further, I shall subjoin the names of some of the authors who have written expressly upon it. Murat, *Dict. des Sciences Med.;* art. *Fœtus*. Osiander, *Handbuch der Entbindungskunst*. Joerg, in his works. Carus, *Zur Lehre von Schwangerschaft und Geburt*. Mende, *Ausführliches Handbuch der gerichtliche Medizin*. C. W. Hufeland, *Die Krankheiten der Ungebornen*, 1837. Meissner, *Kinderkrankheiten*, 1829. Hardegg, *De morbis Fœtus Humani*, 1827. Billard, *Mal. des Enfans nouveauxnes*, &c. Bergk, *De morbis Fœtus Humani*, 1829. Zurmeyer, *De morbis Fœtus*, 1832. J. Grœtzer, *Die Krankheiten des Fœtus*, 1837. Prof. Simpson, *Essay on Peritonitis*, *Ed. Journ.* vol. l. p. 39; *and on Hernia*, vol. lii. p. 17. M. Grœtzer's work is an excellent summary of the labours of his predecessors, and Professor Simpson's Essays are equally admirable for their research, careful observation, and logical deductions.*

262. Death of the fœtus. — But although we may not be able to detect disease in the fœtus, it is often of great importance to ascertain whether it be dead or alive, and it is therefore desirable if possible to determine what are the *signs of its death*. The question *may* be of consequence to the medical jurist, and *is* always to the obstetrician as influencing our decision as the best time for operations.

The diagnosis of a dead fœtus is confessedly very difficult: since the time of Mauriceau the subject has been investigated by many writers, and still, notwithstanding the powerful aid afforded by the stethoscope, many cases are exceedingly doubtful; and for obvious reasons, since most of the symptoms upon which we must rely, depend upon the sensations of the mother, and sensations are notoriously delusive.

263. The signs which are given as evidence of the child being dead are: the cessation of its movements; the subsidence or flaccidity of the abdomen; the recession of the umbilicus; the loose feel of the uterine tumour, and its rolling about in the abdomen; a sensation of dead weight and coldness in the abdomen; the breasts suddenly becoming flaccid, and their secretion suppressed; the health being deteriorated; the appetite bad; the countenance sunk; a dark areola round the eyes; fœtid breath; repeated rigors, &c.

264. Taken separately none of these signs are certain; the movements

* An excellent monograph on the subject of fœtal pathology is contained in the "American Journal of Medical Sciences," for August 1840, and continued in the same journal, Oct. 1841; by William Roberts, M. D., of New York. — Editor.

of the fœtus may be suspended for some days without its being dead; the degree of tension of the abdomen varies much in the course of pregnancy, especially in women who have had several children; the uterine tumour is occasionally felt as a weight (as it were a foreign body) by women who bring forth the child alive; the coldness is a mere sensation, and therefore of little value, a dead fœtus not being really colder than a living one; and the health may be deteriorated, and a dark shade appear under the eyes from many causes besides the death of the fœtus. The breasts, however, seldom become flaccid, after having been tense, from any cause but the death of the child.

Besides, it is a matter of common experience, that women retain a dead fœtus "in utero" for weeks or months, and exhibit few or none of these symptoms. In such cases women have even fancied that they felt the fœtal movements up to the time of labour without any change in the abdomen, breasts, or general health.

265. But although taken singly, none of these signs are conclusive, yet cases occur in which the concurrence of several is nearly so. Suppose, for example, that in the sixth month of pregnancy, a patient should find the motions of the child, which up to that period had been lively, cease, and soon after observe that the abdomen and uterine tumour had lost their tense and rounded form, at the same time feeling the latter weighty and rolling loosely in the lower belly, and finding the breasts, which had been tense, firm, and glandular, subside and become flaccid; we should undoubtedly have *almost* proof of the death of the child.

The value of these signs in short consists in their concurrence, and in their contrast to the patient's previous condition and sensations.

266. We have found the value of auscultation in detecting pregnancy by proving the life of the fœtus, and it may very naturally be asked, what evidence does it afford of its death? in other words, the hearing the pulsations of the fœtal heart proves the child to be alive; does their being inaudible prove that it is dead? I have already stated that in some cases although the child be alive, yet the sound of its heart is inaudible, or temporarily suspended, and such cases of course prevent a directly affirmative answer to the question. Again, much depends upon the tact and experience of the auscultator; one person may detect a pulsation that is inaudible to another: to pronounce, therefore, that a fœtus is dead because we do not at any one visit hear the heart, would be too hasty a conclusion.

But if after hearing the heart pulsating distinctly, we find it gradually or suddenly become inaudible, and continue so, the evidence will be very strong, and if in addition the principal symptoms above enumerated be present, there can be little doubt of the death of the fœtus.

267. Thus far we have considered the signs of the death of the fœtus during utero-gestation previous to labour; when this process commences, other and more distinctive evidence is accessible.

On the rupture of the membranes, when the fœtus has been some time dead, the liquor is frequently changed, being of a dark colour, and of thicker consistence than usual; but if the death be recent, no such alteration will be found.*

* "The liquor" has been repeatedly seen, not only "thicker than usual," but actually fœtid, although the child was alive and healthy. In such cases, it arises probably from decomposition of a portion of blood which is extravasated by a partial separation of the placenta,—or, perhaps, of a small fragment of the placenta itself. — Editor.

Great stress is laid upon the state of the scalp and bones of the cranium, and, I believe, justly. After the fœtus has been dead some time, if the finger be pressed upon the scalp, it is felt to be emphysematous, crepitating under the touch, and a portion of the cuticle will peel off. The bones of the skull also overlap more, and feel loose within the scalp.

When present, these signs are, I believe, conclusive, but the latter only will be found if the death be recent. It is stated by Dr. Parr and others, that no tumour is formed upon the head of dead children; but from some observations I have made, I am not quite sure of the fact. The absence of pulsation at the greater fontanelle, and its diminution from the collapse of the bones, is admitted to be an important sign.

268. In *face presentations*, when the child is dead, the lips are flabby, the tongue flaccid and motionless, and the presenting part slightly swelled. In *breech presentations*, the sphincter of a living child resists or contracts upon the finger, but when dead, it is relaxed. The discharge of meconium is of no value in breech presentations, and of very little in any other. When the *arm* protrudes, it shortly becomes livid and cold, and the pulse at the wrist often imperceptible, but this does not prove the child to be dead. The peeling of the epidermis is conclusive. In *prolapse of the funis*, the pressure to which it is exposed, very soon destroys the child, and in most cases the presence or absence of pulsation in it, is a satisfactory test of the life or death of the child. Dr. E. Kennedy, however, records a very instructive exception to this rule: the cord had been prolapsed for an hour, and during a pain no pulsation was perceptible; when the pain subsided, he "drew the funis backward towards the sacro-iliac symphysis, and then was able to detect a very indistinct and irregular pulsation, which corresponded to a slight fœtal pulsation over the pubis." The forceps were in consequence applied, and the child was saved.

269. Dr. Collins and Dr. E. Kennedy regard the evidence afforded by the stethoscope during labour of the child's life or death as conclusive, or nearly so; certainly the information thus obtained of the changes which occur in the fœtal circulation is extremely valuable, and the gradual diminution in frequency and force of the heart's action, and its ultimate cessation, will probably justify our belief in the death of the child. It must be remembered that it is not simply the absence of pulsation that is to determine our opinion, but its cessation after having been heard.

CHAPTER XI.

ABORTION.—PREMATURE LABOUR.

270. The expulsive action of the uterus may be exerted at any period of gestation, though it appears more easily excited at or previous to the third month, on account of the frailty of the connexion between the ovum and decidua. It is also more liable to occur at the beginning of each month, corresponding to a menstrual period, than during the interval, in accordance with the periodicity peculiar to the female generative system.

If it occur before the sixth month, it is called an *abortion*, subsequent to this period, *premature labour*. It is always an "untoward event," and may exert an unfavourable influence upon the health of the female, but it cannot be considered as dangerous, unless it be accompanied by great hemorrhage, and even in such cases it is rarely fatal.

271. Frequency.—Dr. Collins met with at least 393 premature cases in 16,414; Dr. Beatty met with 21 premature cases in 1200. In my own report, 65 cases of abortion are recorded in 1705 deliveries; Madame Lachapelle records 116 cases in 21,960 cases of pregnancy; M. Deubel 35 in 420; making in all 530 premature cases in 41,699 deliveries, or 1 in 78½.

Mr. Whitehead has recently published some statistics of abortion, of which I shall give an extract. "Two thousand married women in a state of pregnancy, admitted for treatment at the Manchester Lying-in Hospital, were interrogated in rotation respecting their existing condition and previous history. Their average age at the time of inquiry was a small fraction below 30 years. The sum of their pregnancies, already terminated, was 8681, or 4.38 for each; of which rather less than 1 in 7 had terminated abortively. But as abortion occurs somewhat more frequently during the latter than in the first half of the child-bearing period, the real average will, consequently, be rather more than 1 in 7." Of 747, all had aborted once at least, some oftener. "Their average age was 32.08 years. The sum of their pregnancies was 4775, or 6.37; that of their abortions 1222, or 1.63 for each person." From the preceding statements it appears that more than 37 out of every 100 mothers, experience abortion before they reach the age of 30 years. As to the pregnancy most likely to be prematurely terminated, Mr. Whitehead states that of 226 women pregnant for the second time, 20 or 8.8 per cent. had aborted of the first, and of 230 pregnant for the third time, 58 or 25.20 had previously aborted. Of 602 cases, abortion occurred at the following periods: in 35 at 2 months, in 275 at 3 months, in 147 at 4 months, in 30 at 5 months, in 32 at 6 months, in 55 at 7 months, and in 28 at 8 months.*

272. Causes.—The causes of abortion may be either maternal or ovuline.

1. The *maternal* causes may arise from the condition of the mother, or they may be accidental. That certain states of the constitution, or of the general health, render the patient obnoxious to this accident, there can be no doubt; and Denman is probably correct in attributing many cases to this, rather than to the specific cause assigned; for as he observes, "that about which the patient was employed, when the first symptom appeared, is fixed upon as the particular cause, though probably she was before in such a state that abortion was inevitable." The habits of life have also a considerable influence, for we find abortion most frequent in the extremes of society.

On the other hand, it is wonderful with what tenacity the ovum is retained by persons of delicate constitution, and under very trying circumstances; thus women far gone in consumption conceive, complete the term of utero-gestation, and are delivered of healthy children. And

* Whitehead on Abortion and Sterility, pp. 245–6.

Mauriceau mentions a case (Obs. 242) of a woman who fell from a window in the third story of a house, in the seventh month of pregnancy, and broke one of the bones of her fore-arm, dislocated her wrist, and bruised herself very much; yet she fulfilled the period of pregnancy, and was delivered of a living child. Dr. Davis also relates the case of a lady who was thrown from her horse, when three or four months pregnant, and much bruised, yet without interruption to gestation.

So that we cannot pronounce *à priori* that delicate women will abort, although it is undoubtdely a cause far from uncommon.

When this constitutional or local susceptibility is extreme, a very slight shock indeed will be sufficient to cause the accident; thus one lady will miscarry after having a tooth drawn, another from making a false step going down stairs, &c.; and in a case I lately attended, it seemed to be brought on by the lady's reading an account of a railroad catastrophe.

273. Certain local disorders are said to cause abortion, as leucorrhœa, uterine irritation, a patulous state of the os uteri, diseases of the rectum, bladder, &c.

Mr. Whitehead mentions that of 747 women, the sum of whose abortions amounted to 1222, the assigned causes were as follows: —

"Inward weakness," impaired health, and acute disease .	911
Accident, mental perturbation, &c.	222
No assignable cause	90

This "inward weakness," to which so many attribute their miscarriages, is, in fact, leucorrhœa, arising from disease of the lower portions of the uterus. Out of 378 cases an examination showed that 275 were thus affected with inflammation and superficial erosion of the cervix, varicose ulceration, œdema, fissured ulceration, induration of the cervix, endo-uteritis, follicular ulceration, syphilitic disease, &c., thus confirming the statement of M. Boys de Loury and Dr. Bennett as to ulceration being a common cause of abortion.

The same consequence may follow febrile complaints; thus a patient will often miscarry during the course of typhus fever, small-pox, scarlatina, measles, &c.; but it is possible that the miscarriage in these cases, may result from the death of the fœtus, and not directly from the disease. In this way probably it is, that syphilis gives rise to abortion or premature labour.

274. Among the accidental causes of abortion may be enumerated blows, falls, violent concussions, excessive or sudden exertions, straining, severe coughing, &c. which in most cases act by separating partially the ovum from the uterus.

Mental emotions, anger, joy, sorrow, good or bad news suddenly told, may excite the uterus to action, and effect the expulsion of its contents.

Lastly, a female may acquire a habit of aborting. Each occurrence predisposes to a repetition of the accident at about the same period; and after it has happened several times, it is extremely difficult to carry her safely over that period. Thus Dr. Young of Edinburgh had a patient who miscarried thirteen times in succession, and Dr. Schultze one to whom the same accident happened twenty-two times, at or about the same period of gestation. I was myself consulted a short time ago by a lady who stated that in less than three years she had miscarried ten or twelve

times during the second month of gestation. It is remarkable, that these patients seem to have as great an aptitude for conceiving as for miscarrying.

Dr. Tyler Smith (p. 127) has divided the causes of abortion into excentric, centric, and special, so far as the mother is concerned. The former includes the causes already mentioned which act by irritation of the mammary, trifacial, vesical, and uterine nerves; the second, those which act through the medium of the blood, as scrofula, syphilis, the exanthemata, &c.; and the third includes cases of disease.

275. 2. The *ovuline* causes of miscarriage may be stated generally, to be anything which compromises the life of the child, whether the ovum be thereby detached or not. Thus certain pathological conditions of the amnion, chorion, or decidua, the erroneous insertion of the funis, diseases of the placenta, separation of the ovum, &c. must necessarily interfere with the perfect nutrition of the fœtus, and perhaps cause its death and subsequent expulsion. Or the fœtus may die of some of the diseases mentioned in the last chapter. As a rule, it may be stated, that the death of the fœtus will be followed by its expulsion, but the period of this occurrence varies very much; a few days only may elapse, or it may be months, or, in a few rare cases, years. I think also, that the evidence we possess, shows the much greater frequency of the ovuline than the maternal causes of abortion; and if so, we must conclude, that as it is better that a blighted fœtus should be thrown off, so abortion in many, if not most instances, is a salutary effort, when not complicated.

The occurrence of hemorrhage from internal or external causes, is not an unfrequent cause of abortion, partly from the injury done to the fœtus, and partly from the distension and irritation of the uterus. The blood may be effused between the uterus and decidua, between the decidua and chorion, between the chorion and amnion, into the substance of the placenta, or into the cavity of the amnion. It has also been poured into the peritoneal cavity, probably through the fallopian tube, as noticed by Botal, Ruysch, and Smellie.

276. *Symptoms.*—When threatened with a miscarriage, the patient generally experiences a sense of uneasiness, languor, and weariness, with aching or pain in the back; after these preliminary symptoms have lasted for some time, those of labour supervene, and in most cases they do not differ much from those of labour at the full term; the pain may even be as great.

A slight discharge of mucus or blood from the vagina is observed, pains are felt in the back, extending round the loins to the abdomen, and down the thighs, recurring at regular intervals, and increasing in strength and frequency. The stomach frequently becomes irritable, and discharges its contents. The pulse is quickened, the skin hot, voluntary efforts are made in aid of the uterus, and ultimately the contents of the womb, or a portion of them, are expelled.

277. But although these symptoms are generally present, yet the progress of different cases is so dissimilar, that we must enter a little more into detail. Occasionally cases occur where the ovum slips out of the uterus (so to speak) with scarcely any pain, little or no hemorrhage, and followed by a speedy recovery. We see this chiefly in persons who have acquired the habit of aborting. Other patients present the ordinary symp

toms of labour as enumerated above, but which subside after a time, without the expulsion of anything from the uterus, until the expiration of the full term of utero-gestation, when the birth of a full-grown child is accompanied by the expulsion of a blighted fœtus, the case being one of twin conception.

Again, the pains of labour may come on with more or less flooding, and after some time the fœtus alone be expelled, the shell of the ovum being retained. The latter is generally detached after a time, or it may be dissolved, and discharged along with the lochia. So long as it remains, hemorrhage is to be feared; and in many cases where it dissolves by putrefaction, uterine phlebitis is excited; such cases, therefore, excite great anxiety, and require careful treatment.

Lastly, very alarming hemorrhage may precede or accompany abortion. I cannot say that I ever met with a case in which it proved fatal, though I have seen life reduced to the lowest ebb. It is also important to remember, that flooding scarcely ever continues after the expulsion of the ovum.

278. The flooding may be caused by external accidental circumstances, such as blows, falls, &c. or it may result from some condition of the ovum or its vessels beyond our cognizance; it may be internal for a time and afterwards escape, or it may be discharged *per vaginam* from the beginning.

There is of course no difficulty in the diagnosis in the latter case; but it is not always easy to detect internal hemorrhage. In general, the patient becomes pale, exhausted, and faint, with a dark shade under the eyes, and a quick, weak pulse. She complains of headach, lassitude, slight shiverings, occasional dull pains in the pelvis, weight about the rectum, perhaps a difficulty in voiding urine, tightness of the epigastrium, &c. with reaction at intervals.

The uterine tumour, if above the pelvis, will be found unusually tense, and larger than the supposed period of pregnancy would warrant. After a time, the distension of the uterus excites contraction, then the membranes give way, and the blood escapes. The fœtus is of course lost. The intensity of the symptoms, and the injury to the mother are in proportion to the amount of flooding, which, in fact, constitutes the primary danger of an abortion.

Generally speaking, the flooding is less, the nearer the gestation is to its completion.

279. *Treatment.*—The first question that occurs to us when called in to a case of threatened miscarriage, is, whether it *can* be averted. If we possessed any means of ascertaining the state of the ovum and fœtus, the question would probably be, whether it *ought* to be averted; for certainly when the fœtus is dead or seriously injured, it is much better that it should be cast off. But we do not possess this knowledge, and must therefore content ourselves with the conviction, that if the vital relation between the ovum and uterus be compromised, it will be expelled, and in the mean time use the most suitable means to arrest, if possible, the progress of the case, or to avert danger from the mother.

If the hemorrhage be very slight, and the pains very trifling, our efforts may be successful; but if the pains have continued for some time, and are accompanied with bearing down, and especially if there be much

flooding, there is little hope of success. If the patient be robust and plethoric, it will be advisable to take away blood from the arm; and she should repose on a hard bed, lightly covered with clothes, in a cool room, and be kept in perfect quiet, mental and bodily. All causes of irritation, excitement, or distress, must be removed, and stimulants of every kind avoided. We may then attempt to suspend the uterine action, by means of opium or some of its preparations, in full doses.

In such cases I have latterly succeeded several times by means of the tincture of Indian hemp, as prepared by Mr. Donovan of this city, in doses of five to ten drops three times a day.

The acid mixture, cold to the vulva, or an enema of cold water, will be useful, if the discharge increase.

If our attempt thus to arrest miscarriage fail, we must then act according to the circumstances of the case. If there be little hemorrhage, and the pains increase and expel the ovum, little treatment will be necessary.

280. If the fœtus alone be expelled, we may wait awhile (if no flooding occurs) to see if the uterine efforts will detach the secundines; if not, perhaps we may be able to reach the lower portion of them with the finger, and gradually withdraw them; if this fail, we may frequently succeed with the ergot of rye.*

But there are many cases in which none of these plans will succeed. Are we then to leave the case to nature? We know that after a time the shell of the ovum will putrefy, dissolve, and be discharged; but experience too often proves, that this process involves considerable danger: danger of hemorrhage first, and afterwards of uterine phlebitis. I shall speak of the treatment in cases of flooding, presently; and with regard to the danger of uterine phlebitis from absorption of a putrid ovum, it is sufficiently imminent to warrant interference, if we are called early enough. The French recommend a pair of long thin forceps, with which the ovum is to be seized and removed; but against such an instrument there lies the serious objection, that we cannot be certain of not injuring the uterus, unless we introduce the finger also. The late Mr. Wainwright, of Liverpool, published a short paper in one of the journals, in which he recommended extraction of the ovum by introducing the hand into the vagina, and one, or at most two, fingers into the uterus.

That this is practicable, and in certain cases advisable, I know by experience, having repeatedly practised it; but it must be remembered that it is not free from danger, and before we have recourse to it, we should be satisfied that the natural powers will not act, even under the influence of ergot. Further, if done at all, it should be before the secundines have putrefied, or irritative fever set in.†

* The use of the ergot of rye under these circumstances is not without inconvenience; for although it be true that "flooding constitutes the primary danger of abortion," intense pain and nervous excitement are not unfrequent attendants, and ergot never fails to aggravate the sufferings of the patient in these respects. Time, rest, and opium, are the grand remedies in abortion, for which there are no substitutes. Where the strength of the patient and condition of the circulation allow of it, bleeding, in the early stage, if it do not prevent abortion, will rarely fail to mitigate the violence of its attendant circumstances. — EDITOR.

† Dr. Rigby advises the mode recommended by Levret as preferable to the employment of the fingers, viz., to throw up "a powerful stream of warm water by means of a syringe." Dr. Dewees employed a wire crotchet for the removal of the secundines when they were not thrown off spontaneously, or by the use of ergot. This instrument

281. Thus far I have spoken of the treatment of the simpler forms of abortion, let us now proceed to consider those cases which are complicated with flooding. When it is considerable, there is little or no chance of preventing miscarriage, and as the danger from hemorrhage ceases with the expulsion of the ovum, our endeavours must be directed to moderate the discharge, until that event takes place. The most direct means of restraint we possess is *the plug;* but this must never be used, if internal hemorrhage may take place to such an extent as to destroy life: in other words, not if the uterus be empty, and the patient far advanced in pregnancy. If the uterus be filled with its natural contents, or be only slightly distensible, even though empty, we can restrict the amount of loss by filling the vagina, and stopping the external outlet. For this purpose Dewees recommends a sponge; but I have found a silk handkerchief or tow much better. The vagina must be filled completely, and after six or eight hours the plug should be withdrawn, and if necessary a fresh one introduced.*

Cold should be applied to the vulva, by means of a cloth dipped in cold water and suddenly applied: it may be removed after the shock is produced, and re-applied at intervals. I have also seen great benefit from enemata of cold water.

"consists of a piece of steel of the thickness of a small quill at its handle, and gradually tapered off to its other extremity, which is bent to a hook of small size." In the

Fig. 72.

accompanying drawing, (fig. 72,) the instrument is represented of one-third the proper size. Various other contrivances to effect the same object have been proposed at different times; the best, because the safest and most efficient, in my estimation, is the "*placental forceps*" of Dr. Henry Bond of this city. This instrument is well repre-

Fig. 73.

sented in the accompanying drawing (fig. 73). "It is about ten inches long, curved laterally on a radius of about twelve inches, and the blades are about one inch and a half longer than the handles. The blades terminate in an oval expansion nearly half an inch wide. The handles and blades, including the edges of the oval expansion, are rounded or bevelled off, so as to preclude all probability of wounding or pinching any of the surrounding soft parts. The inner part of the oval expansion is made concave and rough, so as to maintain a secure grip upon the body embraced. The curvature is intended to be such, that when introduced with the finger as a director, in cases where the perineum is rigid, there shall be no unnecessary or inconvenient pressure on this part, or on the urethra. The outside of the oval part of the blades is made slightly convex and smooth, without a fenestra, so that in passing them through the os uteri, and expanding them so as to embrace the placenta, there shall be the least danger of abrading or lacerating that part." (*Amer. Journ. of the Med. Sci.*, April, 1844.)—Editor.

* Where, however, there is the least prospect of saving the fœtus, the plug is inadmissible: for by preventing the blood from flowing out of the uterus, it will most probably penetrate between it and the ovum, and thus produce a greater degree of separation.—Editor.

Opium in small doses is very useful, nor does it suspend the uterine contractions.*

Doctors Dewees and Conquest recommend the acetate of lead, and others, large doses of dilute sulphuric acid in infusion of roses; but I cannot say that I have obtained much success from them.

282. When the plug is removed, we should carefully examine the os uteri, so as to ascertain if the ovum is descending: if we are able to reach the lower end of it, it is often possible by a little dexterity to hook it down. If it be beyond our reach, we may replace the plug, or give ergot to excite the uterus to action. Borax is highly esteemed in Germany, and has been recommended by Dr. Copland, for its influence in exciting uterine contraction; it may either be given alone or combined with the ergot.

283. In the majority of cases, the natural efforts or the means just recommended, will succeed in expelling the ovum; but in some they fail, and the patient may be reduced to the verge of death by the flooding, which is kept up by the presence of the ovum. In such cases a more direct interference has been recommended. M. Levret advises warm water injections into the vagina and uterus; Dr. Dewees the use of a wire crotchet, and some French writers (as already mentioned) the use of a delicate pair of forceps.† For my own part, I decidedly reprobate such instruments, when the same benefits can be obtained by the finger, as recommended by Mr. Wainwright. I have several times had occasion to perform this operation in extreme cases, and I have been able to do so with perfect success, as far as the extraction of the ovum is concerned, and without any unpleasant consequences.

But let me be quite understood by my junior readers: such an operation at an early period of gestation is not without danger, and requires delicacy, gentleness, and tact: to have recourse to it in any but extreme cases would be unpardonable rashness; but I should deem it just as wrong, to allow a patient to die of hemorrhage, without having had recourse to it.

284. The *after-treatment* of patients who have miscarried requires great care. The popular belief is, that abortion is more dangerous than labour,

* "In the management of cases of threatened abortion," says Dr. Lever, (*Lond. Med. Gaz.*, 1849,) "it is my rule, if possible, to get a thorough knowledge of the immediate or exciting cause of the hemorrhage or pain, or both; secondly, before using opium, to ascertain the state of the os uteri, and especially whether the anterior part of the neck has lost its plumpness and firmness, and has become soft and baggy. If with the discharge we have a patent state of the os uteri, and if the neck be soft and loose, the exhibition of opium will do harm, by retarding the emptying of the uterus, which must sooner or later take place. But while I do not advocate the use of this drug under the circumstances related, I can speak loudly in its praise after the abortion has occurred, especially if such have been attended with a large loss of blood: it will then allay excitement, tranquillize the circulation, and procure sleep. These remarks, however, do not altogether apply to those cases which menace from accident, or from mental causes, or those which may be said to be due to habit. In these, with the application of cold, perfect quietude, and unstimulating diet, I have known the exhibition of opium by the mouth, or, what I prefer, a cold starch injection with opium, thrown into the bowels, and repeated every night, or more often according to existing circumstances, followed by the best results."—EDITOR.

† Dr. Dewees, it is believed, never employed the "wire crotchet" for the removal of the ovum, but solely to bring away the *secundines* after the rupture of the ovum, and the escape of the fœtus.—EDITOR.

and I am not sure that it is far wrong. No doubt exists that women are as liable to puerperal diseases after abortion or premature labour, as after delivery at the full time, and they require as careful management.

The patient should rest in bed the usual time, and then return gradually to her usual occupations. Attention should be paid to the lochia that they be not checked, and to the bowels. The diet for some days should be bland and unstimulating.

285. The *prophylactic treatment* of abortion or premature labour, requires in the first place, the removal or avoidance of all possible causes; and secondly, the adoption of all means calculated to strengthen the constitution.

The state of the stomach and bowels must be carefully regulated, the diet be light and nutritious, and exercise taken in the open air, but not so as to occasion fatigue. If the patient be robust, the pulse full and quick, and some threatening symptoms present, a small bleeding may be useful; but if she be weak and cachectic, we must have recourse to tonics.

If the patient have previously miscarried, as she approaches again the same period, she must take more rest, lying on a sofa or bed, lightly covered, the greater part of the day, until the period be passed. Rest, more or less absolute, is one of the most powerful prophylactic means we possess.

Cold sponging, the use of the "*bidet*," or cold bathing, as recommended by Mr. White of Manchester, is highly beneficial, provided we guard against too great a shock.

When the habit of miscarrying has been acquired, one of the most effective means of breaking it, is to give the uterus a long rest, by separating the woman and her husband for several months. *

* This habit is sometimes so firmly fixed as to be very difficult to overcome. Dr. Huston states, in a note to a former edition, that he has succeeded in some very obstinate cases by confining the patient to a sofa, commencing some time before the usual period of miscarriage and continuing several weeks after the time had gone by — carefully avoiding the erect position and all unnecessary muscular exertion, and using at the same time injections daily of opium, in sufficient doses to prevent uterine action — the quantity varying from two to five grains in the state of powder, suspended in mucilage. By these means a condition of tolerance on the part of the uterus may be acquired, which will allow gestation to go to the full period. — Editor.

PART III.

PHYSIOLOGY OF THE UTERUS — PARTURITION.

CHAPTER I.

CLASSIFICATION. — DEFINITIONS, ETC.

286. We have now arrived at the last great function of the uterine system — that of Parturition, with its abnormal variations.

It consists in the expulsion of the fœtus and its appendages from the cavity of the uterus, and effects the separation of the child and the mother.

It occurs, as we have seen already, at the end of nine calendar months and a week — ten lunar months — forty weeks, or 280 days, a few days being allowed either way.

287. The magnitude and importance of the event, and the regularity with which it takes place, have induced physiologists of all ages to assign causes for it, but as yet without success.

Thus it has been supposed that the uterine action is excited by the struggles of the fœtus for want of adequate nourishment, or from the constraint of its position, or from the endeavour to breathe: by others it has been attributed to the acrid nature of the liquor amnii. Buffon has likened the process to the dropping of ripe fruit. Hervey, Burdach, and others attribute it to the uterus having obtained its maximum of irritability at the exact time that the fœtal development is complete. It would be easy to fill pages with similar explanations, but these may suffice: they are all either more elaborate expressions of the fact, or mere hypotheses.

288. But though all search has hitherto failed in discovering the exciting cause of labour, it has established the fact, that the periodicity which we found to characterize the other uterine functions, prevails here also. For example, abortion or premature labour, when not the result of external accidental causes, occurs very generally at a monthly or what, but for conception, would have been a menstrual period.

Again, as remarked by Stark and others, the normal period for parturition corresponds to a menstrual period; on this principle Klugè calculates the duration of pregnancy in every case at 280 days, and so much more or less, as impregnation took place immediately before or after menstruation. Speaking generally, labour may be looked for at about the tenth period after the last appearance of the catamenia.

Lastly, in extra-uterine gestation, an attempt at labour occurs very generally at the same period.

So that taking the monthly discharge as the the type of utero-ovarian periodicity, we may observe that it continues, though at times less demon-

strably, throughout the whole period of the functional activity of the sexual system.

After a most ingenious and elaborate investigation, Dr. Tyler Smith considers that he has proved that "ovarian excitement is the law of parturition in all its forms of ovi-expulsion." "When the ovarium is severed from the rest of the sexual apparatus, as in the mammalia and human female, the ovarium is connected with the rest of the parturiant canal by a series of reflex arcs. By means of the spinal excitor nerves of the ovaria, that portion of the spinal centre which presides over the actions of the uterus is, at the end of utero-gestation thrown into a state of excitability or polarity, somewhat resembling the general spinal excitability of tetanus. It is curious that at this time, besides the ovarian excitement of the catamenial period which ushers in parturition, there is upon the surface of the ovarium the cicatrix (corpus luteum) left by the ovarian phenomena of conception, but which speedily disappears after delivery. The uterine nervo-motor system being thrown into such a state of persistent excitability that the uterus firmly contracts equally upon its contents, the fœtus itself, hitherto defended by the liquor amnii, becomes an ordinary excitor, and the reflex actions of labour are gradually established. The equable contraction of the uterus preceding labour is, in effect, just as though the membranes had been punctured in the operation of inducing premature delivery, and the head of the fœtus brought to exert pressure upon the os and cervix uteri."

Admitting that ovarian excitement thus excites uterine action, I do not think Dr. Smith has satisfactorily explained the cause of that excitement occurring regularly at the tenth menstrual period rather than at any other.

289. Classification of Parturition. — The basis of all classification must be the definition of natural labour, inasmuch as the other classes and orders are but deviations from, or complications of it; but upon this definition writers are much at variance. Some make the efficiency of the expulsive force the sole question, and include under natural labours, all such as are terminated by the natural powers. Thus Hippocrates, Smellie, Baudelocque, Rigby, &c. &c. include face, breech, and foot presentations in this class. Others conceive that the presentation ought to be taken into consideration, and therefore Denman, Blundell, Davis, Ashwell, Ramsbotham, &c. &c. limit natural labours to head presentations.

I prefer the latter arrangement, because I deem it better that what we take as natural labour, should present as nearly as possible a perfect type. Now the elements of labour are three:—1, the expulsive force; 2, the child or body to be expelled; and 3, the passages through which it is to be expelled. If these be equally adapted to each other, the natural objects of the labour will be attained, viz. the delivery of a living child with safety to the mother; and the labour may well be termed natural. But this result does not obtain except with head presentations, or at least not in anything like the same proportion; for in breech cases 1 in $3\frac{1}{3}$ are lost, and 1 in $2\frac{1}{3}$ in foot presentations, which is far more than when the head presents. This alone would, I conceive, be a valid reason for limiting natural labour to head presentations; not that the natural powers alone may not terminate the labour with other presentations, but that the average mortality is much higher.

Again, I think that the preponderating frequency of head presentations

ought to have much weight in determining the most natural form of labour; and I find that in 327,802 cases the head presented 321,502 times, whereas breech presentations occur only once in $52\frac{1}{3}$ and footling cases once in $90\frac{1}{4}$ cases.

290. For these reasons, therefore, we shall include only head presentations under the term natural labour, and this will constitute the first great class of labours; the second will include deviations from it, in consequence of inequality or inefficiency in any one of the elementary conditions of parturition, such as inefficient force, defective passages, or abnormal presentation; each of these will constitute a sub-division into orders.

Besides these abnormal deviations from natural labour, there exist many which do not fall under any natural classification, but which may be grouped together as a series of complications, without any necessary relation to the character of the labour. So far then our arrangement will stand thus:

Class I. Natural labour.

Class II. Unnatural labour.

a. From abnormal condition of the expulsive force.

Order 1. Tedious labour.

2. Powerless labour.

b. From abnormal condition of the passages.

3. Obstructed labour.

4. Distortion of pelvis.

c. From abnormal condition of the child.

5. Malposition and malpresentations.

6. Plural births. Monsters.

Class III. Complex labour.

Order 1. Prolapse of funis.

2. Retention of the placenta.

3. Flooding.

4. Convulsions.

5. Lacerations.

6. Inversion of the uterus.

This arrangement is nearly the same as that given by Dr. Merriman in his valuable "Synopsis of Difficult Parturition;" and I think it will be found to include all the important deviations from natural labour. I have not made any distinction dependent upon the kind of assistance required in certain difficult labours (as, for instance, the "manual or instrumental labours" of some authors), but I shall interpolate a few chapters on operative midwifery after treating of pelvic distortions; and add a chapter or two in conclusion, on some of the more formidable diseases of childbed.

291. PRESENTATIONS.—We understand by the presentation, that part which presents itself at the brim of the pelvis. Some writers, especially the French, enumerate a great variety of presentations, all of which, I think, may be advantageously included under four heads.

1. Presentations of the head.
2. " " breech, including the hips and loins.
3. " " inferior extremities, including the knees and feet.
4. " " superior extremities, including the shoulder, elbow, and hand.

Others, such as the back, belly, sides, &c., are so extremely rare, if they occur at all at the full term, that it would be superfluous to treat of them separately. Their practical management would be the same as for presentations of the shoulder or arm.

The following table will give some notion of their relative frequency, in the practice of the same individuals:

Author.	Total No. of Cases.	Head presentations.	Breech presentations.	Inferior extremities.	Superior extremities.
Mad. Boivin	20,517	19,810	372	238	80
Mad. La Chapelle	15,652	14,677	349	255	68
Dr. Jos. Clarke	10,387	9,748	61	184	48
Dr. Merriman	2,947	2,735	78	40	19
Dr. Granville	640	619	2	3	1
Edin. Hospital	2,452	2,225	17	8	4
Dr. Maunsell	839	786	—	21	4
Mr. Gregory	691	645	14	7	4
Dr. Collins	16,414	15,912	242	187	40
Dr. Beatty	1,182	1,105	28	15	4
Dr. Lever	4,666	4,266	59	29	12
Dr. Churchill	1,640	1,119	35	22	9

292. The *diagnosis* of different presentations may be thus generally stated. The *head* may be known by its hardness, by the sutures and fontanelles.

The *breech*, by its softness, by the cleft between the buttocks, the anus, os coccygis, scrotum or vulva.

The *knee*, by its rounded form, by the condyles of the femur.

The *foot*, by its long form, its being at right angles with the leg, the nearly equal length of the toes, the narrow heel, &c.

The *elbow*, by the olecranon process rendering the joint sharper than the knee.

The *hand*, by its shortness, the unequal length of the fingers, and the divarication of the thumb.

293. Positions.—The position, is the relation which some part of the presentation bears to a given part of the pelvis; thus the positions of the head are determined by the relation of the fontanelles to the foramen ovale and sacro-iliac synchondroses; or, in more general terms, the position may be said to be the relation of the extreme points of certain diameters of the child, to the extreme points of the pelvic diameters. These we shall examine in detail in the next chapter.

294. Stages of Labour.—For the convenience of description, it has been the practice to divide the process of labour into so many parts or stages, some making three, others four, five, or six: I shall content myself with three; the first, extending from the commencement of labour to the passage of the head through the os uteri, the second terminated by the birth of the child, and the third occupied by the expulsion of the placenta.

CHAPTER II.

MECHANISM OF PARTURITION.

295. Before describing the phenomena of natural labour, it will be better to investigate the mechanism by which the expulsion of the child is effected, and with this view we shall first examine the elementary agents of parturition, separately, and afterwards their joint action. These primary conditions or agents, are, 1, the expulsive force; 2, the passages; and 3, the child.

296. 1. The expulsive force.—The uterus is in all cases, the main agent in the expulsion of the fœtus, and in some, the sole power employed; as, for instance, when the death of the mother precedes the birth of the child; or when the mother is delivered in a state of syncope or asphyxia, as related by Haller and Henke; or in cases of prolapsus uteri, as mentioned by Wimmer, Chopart, &c.

We have heretofore seen that the uterus, if not muscular, possesses at least the characters of muscularity, that it is composed of regular and irregular layers of fibres; at the time of labour these fibres contract, become shorter and thicker, and by their joint action diminish the size of the uterine cavity. The contractions are periodical, with distinct intervals, and each one is called "*a pain.*" They were so named, no doubt, from the suffering they occasion, but in obstetric language, the term "pains" refers to the uterine action, and not to the suffering.

The contractions commence in the cervix, according to Müller, Michaelis, and Wigand, and there is reason to believe, some time previous to the beginning of real labour, and without suffering, for in most cases, at the commencement of labour, we find a slight degree of dilatation of the os uteri, without any complaint on the part of the patient. After this unconscious uterine action has continued for a time, it is attended with pain, and which marks the commencement of labour. The suffering increases with the increase of the pains. They are seated at first in the loins, and gradually extend round to the abdomen and down the thighs. From their acute, stinging character, these pains, which are limited to the first stage, are called "cutting or grinding pains:" during the second stage, the suffering is less acute, though not less severe, and the uterine contractions being aided by voluntary efforts, the pains are called "forcing or bearing-down pains." The former occasion the patient to cry out, but the outcries are suppressed during the second stage, from the necessity of holding the breath, to fix the chest as a "*point d'appui.*"

The cause of the suffering is, first, the forcible distension of the cervix, next, the pressure of the fibres during contraction upon the nervous filaments, and, lastly, the dilatation of the passages.

The amount of suffering depends a good deal upon the temperament of the patient, and upon the habits of life; among savages it appears slight, but it is excessive in civilized life.

297. Each uterine contraction has a peculiar character; slight at first, it gradually increases until it arrives at its maximum of force, remains

stationary for a short time, and then quickly subsides: and this is characteristic of the entire labour, for the pains which are slight at first, go on increasing in frequency and force, until, having arrived at the maximum degree of power, all obstacles yield before them, and delivery is accomplished.

Another remarkable peculiarity is their periodicity; each pain is followed by a distinct interval of rest and ease, diminishing as the labour advances, but in a regular manner. M. Saccombe has given an exact record of the frequency and duration of the pains, in one case, in his "Elémens de la Science des Accouch." p. 202, which I shall extract. Between 10 and 11 o'clock, A.M. the patient had seven pains, and from 11 A.M. to midday eleven pains, as follows:

				minutes		seconds
From the 1st	pain to the	2d	the interval was	15	and its duration	21
2	"	3	"	14	"	27
3	"	4	"	10	"	27
4	"	5	"	8	"	29
5	"	6	"	7	"	32
6	"	7	"	6	"	35
7	"	8	"	6	"	36
8	"	9	"	6	"	40
9	"	10	"	6	"	42
10	"	11	"	5	"	45
11	"	12	"	6	"	45
12	"	13	"	5	"	47
13	"	14	"	5	"	49
14	"	15	"	5	"	55
15	"	16	"	4	"	1′ 2
16	"	17	"	4	"	1′ 10
17	"	18	"	4	"	1′ 27
18	"	19	"	4	"	1′ 33

At this period the waters escaped, and the head was soon expelled. M. Saccombe remarks that "it results from this observation: — 1. That the interval between the pains, is in inverse ratio to their duration. 2. That the duration of each pain, is in direct ratio to its intensity; that is to say, in proportion as the interval between the pains gradually diminishes, so does their duration increase, and in proportion as their duration increases, so does their intensity." The same conclusions equally apply to the severer pains of the second stage.

298. The pains, as I have already said, commence in the cervix, and gradually involve both the body and fundus; their first effect, as Wigand has observed, being to elevate, as it were, the presenting part, and afterwards to force it down. During a pain, the uterus becomes hard, round, and prominent, with the fundus tilted forwards; when the pain subsides, it softens, but does not quite recover its former flaccidity.

It is impossible to estimate exactly the amount of force exerted by the uterus; it is always in proportion to the resistance, although the mode in which it is exerted varies: in some cases it overcomes the obstacles by rapid and energetic pains, in other cases, the same end is attained by a longer and slower process.

The first stage of labour is completed by the uterine action alone, but during the second stage, it is aided by the voluntary muscles, especially those of the abdomen, which press directly upon the uterus, and by the depression of the diaphragm, which diminishes the cavity of the abdomen.

The additional effort made during the second stage, is owing to the increased amount of resistance to be overcome.

Towards the termination of labour, expulsive efforts are made by the vagina, and these are still more evident in the extrusion of the placenta.

299. Uterine action is not directly subject to the control of the will, although mental emotions exert a considerable influence upon it. For instance, labour may be brought on by mental excitement; and, on the other hand, anger, fear, surprise, &c., may suspend the pains. Betschler relates a case where the labour was arrested by the fright occasioned by a violent storm, and many of my readers are familiar with the case related by Baudelocque, in which the pains ceased each time that the pupils who were to witness the case came in sight of the patient. A temporary suspension of labour on the arrival of the accoucheur (especially if sudden and unexpected), is a very common occurrence.

I have spoken of the voluntary exertions made during the second stage of labour: these, it is true, are at first under the command of the will, but at a more advanced period, it is scarcely possible for the patient to withhold the co-operation of these muscles.

Dr. Tyler Smith thus sums up the motor actions of the uterus at p. 48 of his work: "Volition may be said to affect the process only indirectly. Emotion has a direct influence, but it is accessary rather than essential to its performance. Reflex action is the great physiological power, which being absent, the function of parturition could not be properly performed. Peristaltic or immediate action is the basis or radical element upon which the other causes of motor action operate."

300. 2. The Passages.—Let me recall in a few words to the reader's recollection the diameters of the pelvis: those of *the brim* being — the antero-posterior 4 to $4\frac{1}{2}$ inches, the transverse $5\frac{1}{4}$ inches, and the oblique $4\frac{3}{4}$ to 5 inches; the relative proportion of these gradually changes in the *cavity*, until at the *lower outlet* the transverse is 4 inches, and the antero-posterior 5; in other words, that which was the longer at the upper outlet, is the shorter at the lower. From these diameters a deduction of a quarter of an inch in the antero-posterior, and half an inch in the transverse diameters, must be made, on account of the soft tissues clothing the pelvis.

I also remarked before, the great changes in the axes of the pelvis, which form an obtuse angle with each other, that of the brim looking upwards and forward, and that of the outlet downwards and forwards. Lastly, I pointed out, as an important mechanical agency, the inclined planes of the cavity of the pelvis, the direction of which is downwards and forwards.*

* As no correct idea of the mechanism of labour can be acquired unless attention is paid to the several planes of the pelvis, and the variations produced in the direction of these planes by changes in the position of the body, and by disease, we have taken the liberty to introduce here an extract from Dr. Meigs' "Obstetrics — the Science and the Art," which, with the accompanying illustrations, places this subject in a very clear light.

"Plane of the Superior Strait. — The plane of the strait is an imaginary superficies, the anterior margin of which is at the symphysis pubis, its posterior margin at the promontory, while the rest of its margin touches the inner lips of the linea ilio-pectinea.

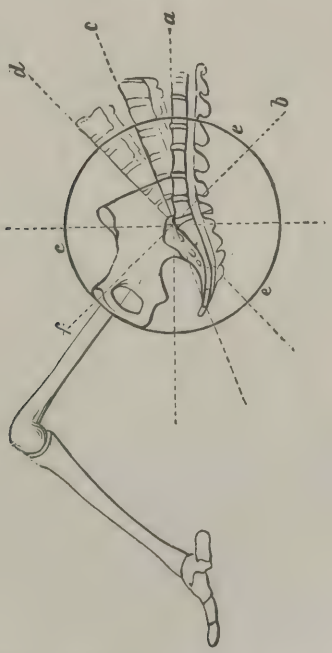
"When the woman stands erect, or lies at length on the back, the plane of this strait dips at an angle of 50° to the axis of her body.

301. Now what mechanical effects are these peculiarities calculated to produce upon the passage of the fœtal head? 1. It is evident that as certain diameters only of the child's head correspond to certain others of the pelvis, the gradual change in these must be followed by a similar change in the *position* of the head; because the expulsive force presses

"Inclination of the Plane.—It must clearly appear that the plane of the superior strait dips at a variable angle in various positions of the trunk of the body; for if the subject be standing, it dips as above at 50°, but if the trunk be inclined forwards, the dip will be lessened; or if the trunk be inclined far backwards, it may be increased. Now this is an important item of obstetric knowledge, since upon it is founded advice as to the decubitus of the patient, whom we may direct to extend her trunk or to flex it more or less, as we may desire to bring the plane of the superior strait into a position that may favour both the entrance of the presenting part into the strait, and its passage through it.

"The figure is designed to show that the plane of the strait may give different angles with the spine, according as the spine is brought more forward, or carried farther

Fig. 74.



backwards over the opening. Thus *c c c* is a circle of which the diameter *b f* represents the inclination of the plane of the upper strait, equal to an angle of 135° *f a*, which is the ordinary altitude of the spinal column or axis of the trunk. If the patient lying upon her back should have her shoulders raised, so as to carry the spine forward to *c*, equal to 22.30°, the angle would be reduced to 112.30°. But if the shoulders should be still more elevated to *d*, the axis of the trunk would be at right angles to the plane of the strait *b f*.

"The same effect as to the inclination of the plane of the strait is produced in the patient, lying on her side, whenever she bends her head and trunk forwards; and, indeed, in labours, we see women constantly prompted by an instinctive sense of the utility of it, bending the trunk quite over the abdominal strait, to which, moreover, the old nurses and experienced crones urgently exhort them. A child's head, that in

the head forwards, and it *can* only advance by making this adaptation. 2. The change in the direction of the axes, and the effect of the inclined planes, more especially of the curve of the sacrum, must necessarily effect a change in the *direction* in which the fœtal head moves, in fact, they alter it from that of the axis of the brim, to that of the outlet.

one inclination of the plane should be driven against the symphysis pubis, would with a lesser inclination of it plunge at once to the bottom of the pelvis.

"Justus Heinrich Wigand, the lamented author of the celebrated volume entitled *Die Geburt des Menschen*, was deeply impressed with the importance of a careful attention to the inclination of the plane in labours. He often made use of his knowledge of it as a foundation of his prognosis. I have copied these outline figures from the second edition of his work, by Froriep. They represent the female torso in profile. Each figure has marked upon it six lines, of which the two horizontal ones extend parallel to each other, from the promontory of the sacrum and the symphysis pubis respectively.

"In a well-formed pregnant female, the profile will resemble the outline figure, provided the child be not very large, nor the liquor of the amnios excessive in quantity. As in fig. 75, the back bone will not be excessively curved. A line drawn horizontally

Fig. 75.

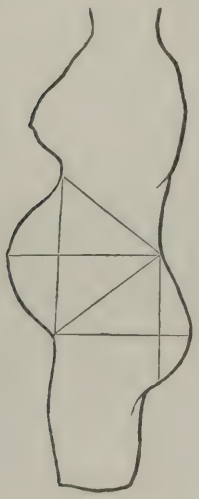
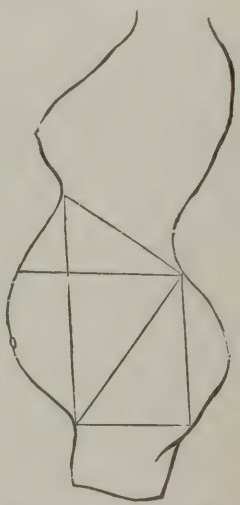


Fig. 76.



forwards from the top of the sacrum will pass out at the navel, and equal angles will be formed by a line drawn from the top of the sacrum to the symphysis pubis, which indicates the inclination of the superior strait, and one drawn from the same point to the scrobiculus cordis. A line from the scrobiculus cordis to the symphysis pubis, will be perpendicular to the one first mentioned.

"Inspection of such a figure might well serve to establish a favourable prognosis; since, cæteris paribus, any untoward circumstances would be very little to be expected with so perfect a form, proportion, and arrangement of parts.

"Figure 76 is a copy of Wigand's figure 3d, in which he proposed to represent the profile of a pregnant woman of apparently perfect form, but the inclination of whose superior strait is excessive, as may be seen by observing the line drawn from the top of the sacrum to the top of the symphysis pubis. In such a patient the plane of the strait looks almost backwards, and the indication of *Conduct* would be to cause her to bend her body strongly forwards, flexing her thighs very much upon the pelvis. Such a direction alone might suffice to correct the excessive inclination of the plane, whereas, if she should lie on the back with the shoulders low, and the limbs extended, the presenting part could hardly fail to be driven upon the top of the ossa pubis. In this figure the back is much more curved than in the former one. The horizontal line, from the base of the sacrum to the symphysis, rises far above the navel, and the upper triangle or that of the scro-

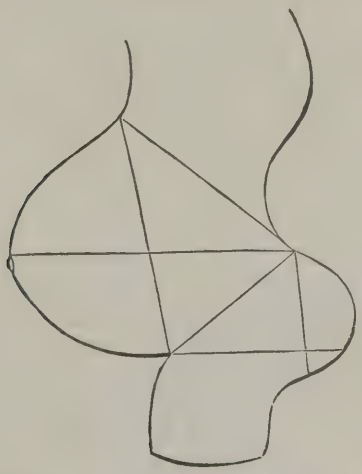
But in order that this adjustment of position and alteration of the diameter may be effected, two things are necessary, first, that the pains should continue (with intervals), and, secondly, that the fœtal head should correspond to the size of the pelvis; for if it be too small, it will want the due resistance, and may be driven through the pelvis irregularly, and if it be too large, it will not pass at all.

bicle is much smaller than that of the pubis. The line falling from the scrobicle to the pubis retires, whereas in the former figure it is perpendicular. In this figure the perpendicular line from the base of the sacrum is far in advance of the upper dorsal vertebræ.

"The contemplation of these ingenious profiles of the admirable German cannot fail to increase the tact and knowledge of the student, to whom the study of them is warmly recommended.

Here is Wigand's Fig. 4, in which is the profile of a woman with a pelvis so deformed as to imply a necessity for the operation of perforation, on account of its vitiated con-

Fig. 77.



jugate diameter. The angle formed by the back part of the sacrum and spinal column is much too small. The bend is quite different from the gentle curve seen in the first profile. The scrobicle projects very much over the symphysis pubis, as by the line uniting them may be seen. The horizontal line from the base of the sacrum comes out just above the navel. The line from the scrobicle to the base of the sacrum, and that from the sacrum to the pubis are not equal — as in the first and more perfect figure. The chord line from the promontory to the coccyx retires, and the whole of it is in rear of the upper part of the spinal column.

"Wigand's 5th figure (Fig. 78) represents a pregnant woman, the conjugate diameter of whose superior strait does not exceed one inch or one inch and a half; and which, according to most of the German accoucheurs, indicates a resort to the Cæsarian operation.

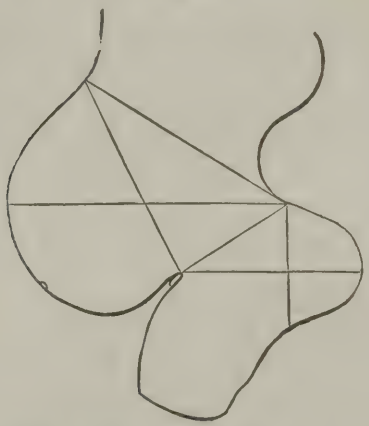
"The belly is quite pendulous over the pudenda. The plane of the strait makes a very sharp angle with the horizontal line which comes out high above the umbilicus. The back is extremely hollow, in consequence of the sinking of the sacral promontory down towards the pubis, and the line from the scrobiculus cordis to the ossa pubis retreats strongly in a backward direction, leaving the breast to hang far over the pudenda in front. The curve of the sacrum is sharp, and the compensating curvature of the upper part of the vertebral column is highly characteristic of this malformed pelvis, and is an evil omen to the unfortunate woman.

"Such are some of Wigand's outline figures. I believe that the study of them will be very useful to the student. It takes many years of practice, and a great clinical experience and close observation like Wigand's, to enable one to become possessed, at a glance, of the peculiarities of the case. He, however, was a *Master* in our art, a man

302. Our estimate of the passages, however, would be incomplete, if we did not regard the uterine cavity as forming one extremity of them. The long axis of the child's body is almost always in accordance with the long axis of the uterus, but previous to labour, the latter is not in accord-

who devoted his time to its improvement, and spent the last moments of his truly missionary life in labouring to complete the beautiful volume from which I have taken his drawings. It is a privilege and an honour to evoke such a man from his too early grave, in order that he, though dead, may yet speak in this distant land.

Fig. 78.



"PLANE OF THE INFERIOR STRAIT. — The plane of the inferior strait is usually regarded as bounded by the inner lips of the two tuberosities of the ischial bones, the rami of the ischia and pubis, the ischio-sacral ligaments, and the point of the coccyx. In this way we speak of the plane of the inferior strait as one plane only; whereas, there are, in fact, two such planes, an anterior and a posterior.

"This figure exhibits the contour of the outlet. The line *c d* represents the transverse diameter. The letters *c e a e d* show the anterior semi-circumference, while *c f b f d*

Fig. 79.

show the posterior semi-circumference of the outlet. Now from *c d* to *a* is an inclined plane, and from *c d* to *b* is another inclined plane. These planes intersect each other at an angle of 140°, and they ought to be distinguished as the anterior and as the posterior inclined planes of the perineal strait.

"In midwifery it will be found that as the child descends, in order to escape from the womb, it first impinges upon the posterior inclined plane, which it depresses first, and then begins to depress the posterior edge of the anterior inclined plane. When it has succeeded in depressing the edges of the two planes, it escapes betwixt them, whereupon they resume their place like two valves, whose floating margins had been first violently separated, and then allowed to close again."—EDITOR.

ance with the axis of the brim, but rather more perpendicular: the uterine contractions, however, remedy this by tilting the fundus uteri forwards, and so place the child in the right line of direction for entering the pelvis.

303. Having said thus much of the passages generally, let us endeavour to estimate the *obstacles* which the head meets in its progress: the *first* of these is the *cervix uteri*. The resistance it offers appears to be the effect partly of muscular action, and partly of its elastic cellular tissue; but, as Dr. Murphy has observed, more generally of the latter than the former, unless there be much irritation. The dilatation is evidently in the first instance purely mechanical, and effected by repeated efforts, rather than by great force at one time, but afterwards the dilatation is aided by muscular action. This will be rendered clear by considering the process more in detail. During the last few weeks of gestation, the cervix becomes slightly softened and dilated, and the result of the first pains which retract or elevate the child, is to press down a pouch of membranes filled with liquor amnii ("the bag of the waters"). This forms a firm, equable wedge, adapted to any size or form of the os uteri, and which, as the uterine fibres of the body and fundus are stronger than those of the cervix, must be forced down into and through the os uteri with each pain, dilating it to the size of the wedge thus formed, and continuing the process until the membranes give way. So far, all is mere mechanical dilatation, but if a prolonged and careful examination be made, when the child's head is substituted for the wedge of membranes, it will be found, that the contractions of the fibres of the cervix which at first narrow the os uteri, do at length retract it over the head more and more each time, until, at length, the combined retraction of the os uteri and propulsion of the head, force it altogether through the cervix. This is particularly ascertainable in certain cases, when the anterior lip is unusually long in dilating. Besides the effective way in which this arrangement attains its object, it has other advantages; the os uteri is dilated by the bag of the waters with far less pain, than by the fœtal head.

The *second obstacle* is the bony circle of the brim of the pelvis, into which the head can only pass, by the adaptation of certain of its diameters to those of the pelvis, and even then, the apposition is so exact that it requires a degree of compression, or "moulding" of the head, to facilitate its entrance. This is further aided by the head being placed obliquely in every way, and it is at length effected by repeated pains. When this moulding is completed, and the due position attained, the head is gradually propelled into and through the cavity, receding somewhat after each pain, and again advancing, in a somewhat spiral direction, until it arrives at the *third obstacle*, or lower outlet, closed in by ligaments, muscles, cellular tissue, &c. and external to these the perineum. These tissues resist long, and their dilatation is very painful; they are first softened by mucous discharge, and then relaxed (how I know not), long before there is direct pressure upon them: afterwards, they are subject to alternate pressure by the head and relaxation, until being fully distended, they yield, and the head directed forward by the curve of the sacrum, is applied directly to the vaginal orifice, and gradually, very gradually, forced through it.

With first children the mucous membrane of the vagina is more or less

everted, and frequently torn, without the injury extending to the perineum.

The amount of resistance varies in different subjects: it is greatest with first children, and in women of advanced age; it is also greater in the second than in the first stage, but more rapidly overcome, owing to the greater force employed. The facility with which the head traverses the pelvis, depends partly upon the force, and partly upon the amount of compression which it will bear: this is very considerable, though it is less if the sutures be ossified.

304. These obstacles constitute the natural division of labour into stages; the first terminating when the os uteri ceases to impede the descent of the head, and the second with the passage of the child through the lower outlet, as already mentioned.

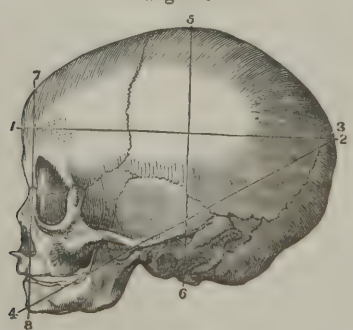
The length of each stage is of course in proportion to the resistance, and inversely to the power employed: but in natural labours it is as about 2 or 3 to 1 (at least in first labours), *i. e.* if the whole labour be 12 hours, the first stage will probably be 8 or 9 hours: but, of course, this will vary much, and, within certain limits, without injury.

When, however, the entire labour is indefinitely prolonged, the relative proportion of the two stages is altogether destroyed, and either may be many times as long as the other. We shall speak of this by and by. Of the third stage (expulsion of the placenta) I shall treat under natural labour.

305. 3. The Child. — I have not much to add of the mechanical influence of the child in the process of labour, inasmuch as it is altogether passive. The measurements of the child's head are as follows:

1.	The longitudinal diameter from	4 to $4\frac{1}{2}$	inches.
2.	The transverse	$3\frac{1}{2}$ " 4	"
3.	The occipito-mental or oblique	5	"
4.	The cervico-bregmatic	4 " $4\frac{1}{2}$	"
5.	The trachelo-bregmatic	$3\frac{1}{2}$ " 4	"
6.	The inter-auricular	3	"
7.	The fronto-mental	$3\frac{1}{2}$	"

Fig. 80.



The first of these diameters corresponds to the oblique diameter of the brim and antero-posterior of the lower outlet; the second to the antero-posterior diameter of the brim and transverse of the lower outlet in ordi-

nary cases; the third to the antero-posterior diameter of the lower outlet in face presentations: the others to certain diameters of the pelvis, to which the head is only transitorily applied.

The transverse diameter of the shoulders is from $4\frac{3}{4}$ to $5\frac{1}{2}$ inches.
" " " hips " 4 " 5 "

These diameters being at right angles with the long diameter of the head, it follows that when the latter corresponds to the longer (or antero-posterior) diameter of the outlet, they will be exactly in apposition with the long diameter of the brim.

306. The diameters are pretty regular in well-developed infants, and correspond very closely to those of the clothed pelvis. Yet certain adaptations facilitate the transit of the child: viz. the compressibility of the head and body of the child, which it is calculated will permit it to be forced through a pelvis whose antero-posterior diameter at the brim is only three inches. And further, the head enters and passes through the pelvis obliquely both as to its longitudinal and transverse axes, *i. e.* one fontanelle and the anterior part of the presentation is lower than their opposites, thus diminishing the longitudinal transverse diameters from a quarter to half an inch.

This appears to be the proper place to notice some very interesting researches, published by Prof. Simpson, of Edinburgh, in the Edin. Med. and Surg. Journal for Oct. 1844, on the different size of the head in male and female children, and the consequences which result to the mother and child.

He states that the head of the male at birth is larger than that of the female, in its circumference, by $\frac{3}{8}$ths of an inch, in its transverse diameter by $\frac{1}{8}$th and in the inter-aural diameter by $\frac{2}{8}$ths of an inch.

Now it appears from the following table, that the proportion of males is greater than that of females in some very important deviations from natural labour.

	Total Cases.	Males.	Females	Proportion.
Tedious labour	119	65	54	148 to 101
Convulsions	28	17	11	153 " "
Puerperal fever	88	54	34	161 " "
Ruptured uterus	34	23	11	207 " "
Hemorrhage	44	31	13	240 " "
Forceps	24	16	8	200 " "
Crotchet cases	74	50	24	200 " "

From a large collection of facts bearing upon and illustrating the different questions, the author has drawn the following conclusions of the dangers consequent upon this slight excess of size in male children.

"1. Of the mothers that die under parturition and its immediate consequences, a much greater portion has given birth to male than female children.

2. Among labour presenting morbid complications and difficulties, the child is much oftener male than female.

3. Among the children of the mothers that die from labour or its con-

sequences, a larger proportion of those that are still-born are male than female; and on the contrary, of those that are born alive, a larger proportion are female than male.

4. Of still-born children, a larger proportion are male than female.

5. Of the children that die during the actual progress of parturition, the number of males is much greater than the number of females.

6. Of those children born alive, more males than females are seen to suffer from the morbid states and injuries resulting from parturition.

7. More male than female children die in the earliest periods of infancy, and the disproportion between the mortality of the two sexes gradually diminishes from birth onwards until some time subsequently.

8. Of the children that die in utero and before the commencement of labour, as large a proportion are female as male.

9. In laborious labour with the head presenting, in proportion as the order of labour rises in difficulty, the amount of male births in them rises in number.

10. Of the morbid accidents that are liable to happen in connexion with the third stage of labour, as many take place with female as with male births.

11. More dangers and deaths occur both to mothers and children in first than in subsequent labour.

12. The average duration of labour is longer with male than with female children."

The long axis of the child in general corresponds to the long axis of the uterus, though occasionally it is somewhat oblique: this, according to Desormeaux, occurs once in 249 cases, according to Meckel once in 287, and to Osiander once in 300 cases.

307. Having now considered these elementary powers or conditions of labour separately, we are prepared to examine them in action; in other words, to ascertain the MECHANISM OF PARTURITION. Nothing can be more simple, but certainly nothing more erroneous than the views held by the older writers on midwifery. They concluded that the head passed through the pelvis, in the same position as that in which it emerges from it, that is, with its long diameter antero-posteriorly. The first writer who corrected this opinion was Sir Fielding Ould of this city, who wrote in 1742, and who stated that in the first part of its progress the face is turned to one side or other of the pelvis, "so as to have the chin directly on one of the shoulders." Dr. Smellie in 1752 corrected the error of Ould with regard to the contortion of the child's neck, but in other respects agreed with Sir F. Ould. Similar opinions were promulgated in 1770 by Deleurye in France, and subsequently by Schmitt and Mampe in Germany.

The next step in advance was made (without inter-communication) by Saxtorph of Copenhagen, and Solayres de Renhac of Montpellier, who in 1771 published two essays, which agreed in this fact, that the long diameter of the head of the child in natural labour, entered the pelvis in a direction neither parallel to the conjugate, nor to the transverse diameters of the brim, but parallel to one of its oblique diameters; that is, with the sagittal suture running in a line directed at one extremity to the sacro-iliac synchondrosis behind, and to the foramen ovale anteriorly. They further showed that of the two oblique diameters, the long axis of the head, in a very large proportion, occupied the right, or that running between the

right sacro-iliac synchondrosis and left foramen ovale. M. Baudelocque adopted the opinions of his master, Solayres de Renhac, as the basis of his arrangement, and through his great influence, the doctrine of the oblique position of the head has been generally diffused and received.

There were, however, many points which needed revision and correction; and for the full demonstration of that which was true, and the correction of that which was erroneous, and the addition of many new observations, we are indebted to the labours of the celebrated Naegelè of Heidelberg, who in 1818 published his essay on the Mechanism of Parturition, which was translated into our language by Dr. Rigby in 1827. The more closely his opinions have been tested by experience and careful observation, the more clear does their correctness appear.

Having so high an estimate of the labours of M. Naegelè, the reader will not be surprised at my adoption of his descriptions in the present volume; and it would give me great pleasure, if on my recommendation, all my readers would peruse his excellent essay.

308. We have already stated (§293) that the position of the head, is the relation which its diameters bear to those of the brim of the pelvis; or, in other words, the situation of the extreme points of the longitudinal diameter of the head compared with the extreme points of the oblique diameter of the brim. Now the former are sufficiently well indicated by the anterior and posterior fontanelles, and the latter by the foramen ovale, right and left, and the sacro-iliac synchondrosis, right and left.

Thus then, according to Naegelè, the head may present at the brim in *four positions:* in the *first*, the posterior fontanelle corresponds to the left foramen ovale; in the *second*, to the right foramen ovale; in the *third*, to the right sacro-iliac synchondrosis; and in the *fourth*, to the left sacro-iliac synchondrosis: the anterior fontanelle of course corresponding to the opposite extreme of the oblique diameter.

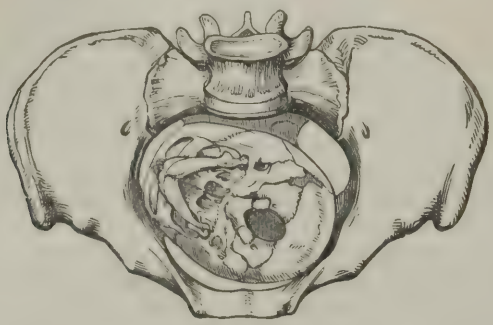
These numbers do not correspond with those affixed to the presentations of other writers, but in order that no confusion may arise, I shall extract from the Brit. and For. Review, a table of corresponding numerals of different authors.

Numbers affixed to Presentation by						Description of Presentation.
Rigby.	Naegelè. Capuron. Naegrier. Dugès. Hatinagrand.	Baudelocque. Dubois. Gardien. Davis. Dewees.	La Chapelle.	Boivin. Hamant. Moreau.	Ramsbotham.	Anterior part of Cranium pointing to
1	1	1	1	1	3	Right sacro-iliac synchondrosis.
	2	2	2	2	4	Left do. do.
2	3	4	3	4	6	Left foramen ovale.
	4	5	4	5	5	Right do.
		3		3	7	Promontory of sacrum.
		6		6	8	Symphysis pubis.
			5	7	1	Right os ilium.
			6	8	2	Left do.

209. Now let us trace the progress of the head in the different positions.

In the FIRST POSITION, it is, as I have stated, placed obliquely, corresponding to the left oblique diameter of the brim, the posterior fontanelle being towards the left foramen ovale or acetabulum, and the anterior towards the right sacro-iliac synchondrosis, the two fontanelles being at first on a level; consequently the sagittal suture will run nearly in the oblique

Fig. 81.

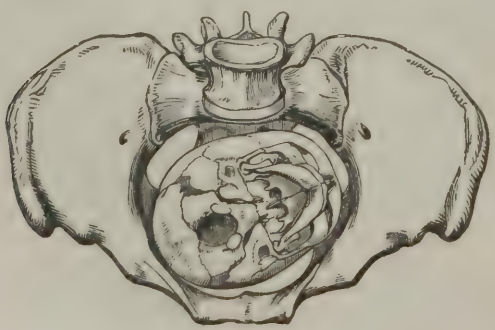


diameter of the brim, but rather nearer to the sacrum than the pubis, because the anterior half of the presentation is almost always lower than the posterior. If the finger be at this time introduced into the centre of the os uteri, it will impinge upon the right tuber parietale, upon which the tumour is formed.

By the action of the uterus, the head is forced downwards into the cavity, preserving in some cases merely the obliquity it possessed at the brim; but in most cases, it assumes an oblique position as regards its longitudinal axis, one fontanelle, generally the posterior, being lower than the other; this is more remarkable as the head advances. In other respects, the position of the head and the presenting part is unaltered in the cavity, the posterior fontanelle still corresponding to the foramen ovale, and not, as frequently stated, to the arch of the pubis.

When the head arrives at the lower outlet, Naegelè observes, "by continued pressure of the uterine contractions, the posterior fontanelle gradually moves itself by slight degrees, repeated at equal intervals, in a direction from right to left (frequently more or less from above down-

Fig. 82.

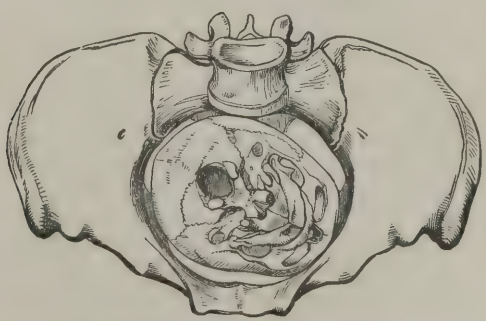


wards), and the occipital bone advances from the side of the pelvis under the arch of the pubis. It is not, however, the centre of the occiput that advances under the pubal arch, but the head approaches the os externum with the posterior and superior part of the right parietal bone, and remains in this position, until it has passed through the outlet of the pelvis with the greatest circumference which it opposes to it, when it then turns itself with the face completely towards the right thigh of the mother." That the head really passes thus obliquely through even the external parts, may be proved by tracing the sagittal suture, which will be found running obliquely from left to right, and by examining the tumour of the scalp, which after delivery extends behind and above the tuber parietale, upon which the primary tumour formed by the circle of the os uteri was situated.

310. When the head is in the SECOND POSITION, its longitudinal diameter corresponds to the right oblique diameter of the pelvis, and it is placed obliquely as in the former case, acquiring the second obliquity as it descends; and it passes through the pelvis and lower outlet precisely in the same mode as in the first position, only that the slight rotation is from right to left, and that when expelled, it completes the quarter-turn, bringing the neck under the arch of the pubis.

311. In the THIRD POSITION the anterior fontanelle corresponds to the left acetabulum, and the posterior to the right sacro-iliac synchondrosis, at nearly the same level, until the pressure occasions one or other (generally the posterior) to descend. The sagittal suture divides the os uteri obliquely and unequally, and the tumour of the scalp is found upon the tuber parietale of the left side, and rather anterior to it; and the finger, passed in the centre line, impinges upon it.

Fig. 83.



"As soon as the head is engaged in the cavity of the pelvis," Naegelè observes, "the great fontanelle turns towards the descending ramus of the left os ischium, and both can be felt at an equal height as to each other. As soon as the head experiences the resistance which the inferior part of the pelvic cavity opposes to it, or, in other words, the oblique surface which is formed by the lower end of the os sacrum, by the os coccygis, the ischiatic ligaments, &c. by which it is compelled to move from its position backwards, in a direction forwards, it turns by degrees with its

great diameter into the left oblique diameter of the pelvic cavity; *i. e.* the posterior fontanelle is directed to the *right* foramen ovale, and as the head approaches nearer and nearer to the inferior aperture, it is the posterior and superior quarter of the left parietal bone, which is felt in the cavity of the pelvis, opposite to the pubal arch; so that when the point of the finger is introduced under and almost perpendicular to the symphysis pubis, it touches nearly the middle of the superior and posterior quarter of the left parietal bone; and this is precisely the part, as the head advances further, which first distends the labia, with which the head first enters the external passage, and the spot upon which the swelling of the integument forms itself." Thus, the head is changed from the third position into the second, and so passes out, the face, according to Naegelè, generally turning towards the left thigh of the mother.

Fig. 84.

312. In the FOURTH POSITION the posterior fontanelle corresponds to the left sacro-iliac synchondrosis, and the anterior fontanelle to the right foramen ovale; and as the head is pressed through the cavity of the pelvis, changes, analogous to those just described, take place, but in the opposite direction, that is, the head is turned from left to right, so as to bring the posterior fontanelle towards the left foramen ovale; in other words, that as the head is changed from the third to the second position, so from the fourth it changes into the first. It then passes out, exactly as it did when presenting in the first position. The primary tumour will lie on the right parietal bone, anterior to the tuber; but the pressure of the lower outlet will extend it over the tuber, to the upper and back part of this bone.

313. When the head presents in the third or fourth position, if the pelvis be unusually large, or the fœtal head unusually small, or even with a pelvis and head of ordinary proportions, if the pains come on very violently when the head is at the upper outlet, the changes into the second and first positions may not take place, owing to the absence of sufficient resistance or adequate time, but the head be driven through the pelvic cavity and lower outlet in the position (or nearly so) in which it presented at the brim, the upper and anterior part of the left (third position) or right (fourth position) parietal bone, and a portion of the superior part of the frontal of the same side, corresponding to the arch of the pubis, and the posterior part of the right or left parietal bone, and part of the occipital,

sweeping over the perineum. As the head passes out, the forehead looks upwards, under the arch of the pubis. Naegelè states, "Of ninety-six cases of the third vertex position, which I observed with particular care, and described in my note-book, I remarked the head *three times* to come through the external passages with the head upwards or forwards."

This occasions more suffering, and some delay, as the longitudinal diameter of the head is presented to the lower outlet without adaptation or modification.*

314. Until very recently, the passage of the head with the forehead under the arch of the pubis was believed to be the ordinary termination of presentations in the third or fourth position; but since the publication of Naegelè's work has directed more careful attention to this point, abundant proof has been obtained "that what has been considered as a regular phenomenon, is a deviation, and exactly that which has been esteemed a deviation from the usual course and rule, is perfectly regular." Solayres de Renhac and W. I. Schmitt noticed the change from the third into the

* "The mechanical form of the pelvis," says Dr. Meigs, "is so miraculously adapted to the wants of the economy in labour, that it has power, in a major part of these fourth positions, to rotate the vertex from the right sacro-iliac junction to the right acetabulum, and thence to the pubal arch; and that without any assistance given by the accoucheur.

"It is true that this favourable rotation sometimes requires the aid of the hand, or even of an instrument. It also occasionally happens, that neither the hand alone, nor any instrument, can enable the surgeon to bring the vertex round to the front. In such case, it slides into the hollow of the sacrum, and the labour is thenceforward rendered more painful and more difficult.

"When, in fourth positions, the vertex can rotate first to the acetabulum, and then to the arch, the labour is not seriously retarded; but when the posterior fontanelle gets into the hollow of the sacrum, and will not suffer rotation, then the flexion becomes greater and greater as the fontanelle slides down along the point of the sacrum, along

Fig. 85.

the face of the coccyx, and down the mesial line of the perineum, until having pushed off the perineum 4.10, the occipito-frontal diameter, the vertex slips over the fourchette, and immediately turns over backwards, in strong extension, which allows the forehead, eyes, nose, mouth and chin successively to emerge from underneath the crown of the pubal arch, to complete the birth of the head. The annexed figure of a head in an occipito-posterior position, shows these truths clearly enough.

"This is the mechanism in all cases of birth in occipito-posterior positions, without rotation to the front; and the student will clearly understand that it must be so, since the length of the line from forehead to vertex is too great to permit it to be otherwise." *Obstetrics, — the Science and the Art.* — EDITOR.

second position; but for the minute explanation we are indebted to M. Naegelè.

315. As to the comparative frequency of the four positions: there is no doubt of the greater predominance of the *first;* it occurred to Naegelè in the proportion of 69 per cent. of all his head presentations; to Madame Lachapelle in 77 per cent.; to Madame Boivin in 80 per cent., and to M. Halmagrand in the ratio of 74 per cent.

The *fourth* position is also confessedly the least frequent, occurring to M. Naegelè in the ratio of .03 per cent.; to Lachapelle and Halmagrand in .04 per cent., and to Madame Boivin in .05 per cent.

There is a great difference of statement, however, as to the comparative frequency of the *second* and *third* positions; thus Naegelè, in 1290 cases, only met with the *second* position in one instance, or in the proportion of .07 per cent. M. Halmagrand describes it as occurring in 5 per cent.; Madame Boivin in 19 per cent., and Madame Lachapelle in 21 per cent. On the other hand, Naegelè found 359 cases of the *third* position in 1210 cases, or 29 per cent., while Madame Lachapelle gives only .077 per cent. of such cases, and Madame Boivin only .05. Dr. Simpson observed accurately the position in 335 cases of cranial presentation, and found the first position in 256 cases, the second in 1, the third in 76, and the fourth in 2 cases.

It is extremely difficult to explain these discrepancies satisfactorily. M. Naegelè conceives that the examination was not made until after the change from the third into the second position had been effected; and he thinks that this opinion is confirmed by the fact that the frequency of the second position of authors, agrees with the frequency with which he has observed the head to present in the third position. The researches of my friends Dr. Breen, Professor Simpson, &c. have led them to coincide with Naegelè, and correctly so in my opinion.

316. Diagnosis. — The diagnosis of the positions of the head is a matter of some difficulty, and requires delicacy of tact and experience; of course, the difficulty is greater before the os uteri is dilated. Naegelè has laid some stress upon the fact, that the movements of the child are felt more on one side than the other; so that when this happens on the right side, as is most frequent, we may presume the head to be in the *first* position, and when on the left side, in the *second.* That this observation is correct, my experience leads me to believe; but it affords no means of distinguishing between the first and fourth, nor between the second and third positions.

The stethoscope has also been called in to our aid, and in many instances the information it affords is conclusive. We cannot always distinguish a head from a breech presentation by it; but if by other means we can ascertain that the head presents, it is possible by this means to detect the position earlier than by any other. "Thus," M. Naegelè, jun. observes, "if in a case of vertex presentation, the pulsations of the fœtal heart are distinctly heard in the left inferior abdominal region, diminishing in intensity as the ear leaves this part, but extending upwards and forwards, and continuing audible as far as the linea alba, or even beyond it, it may be presumed that the head occupies the first position. We are warranted in supposing that the head is situated in the second position if

the heart's pulsations are most distinctly heard in the right side of the abdomen." *

Careful observation of the movements of the child and of the stethoscopic phenomena, have also led to the conclusion that in some cases the child takes up its position at an early period, and does not change it till birth; whilst in other cases the changes are frequent, but diminish towards the eighth month. The fœtal heart will always be found to correspond with the motions of the child as felt by the mother.

317. We possess an unfailing test of the correctness of our diagnosis in the tumour of the scalp, or "caput succedaneum," as it has been called. It is formed by the pressure of the head against the opening through which it has to pass, *i. e.* first against the lips of the os uteri, and secondly against the circumference of the vaginal orifice, and it always forms on the lowest or presenting part, so that the primary tumour indicates the part of the head which presented at the os uteri, and the primary and secondary together, that which occupied the lower orifice. The tumour itself consists most frequently of serum, sometimes with blood mixed, and in a few cases of blood alone.

We have already seen, that, in the first position, the primary tumour occupies the right tuber parietale, and the secondary, in addition, the posterior and superior arch of the parietal bone, with a part of the occipital bone occasionally: in the second position, it occupies the left tuber parietale primarily, and the posterior angle secondarily: in the third, the primary tumour is somewhat anterior to the tuber parietale; but by the change to the second position the tuber and posterior part of the bone become the seat of the secondary tumour: and in the fourth, the primary tumour is anterior to the right tuber parietale, but the secondary tumour includes it and the posterior part of the bone.

* A Treatise on Obstetric Auscultation, translated by Dr. West, p. 71.

CHAPTER III.

PARTURITION.—CLASS I. NATURAL LABOUR.

318. Definition.—The term "natural labour" is applied to those cases in which the head presents, and descends regularly into the pelvis; where the process is uncomplicated, and concluded by the natural powers within twenty-four hours (each stage being of due proportion), with safety to the mother and child, and in which the placenta is expelled in due time.

Slight differences will be found in the definitions given by different authors; for instance, Dr. Power limits the time to six hours; Dr. Cooper to twelve; whilst Dr. Breen extends it to thirty hours. Dr. Burns also includes the fœtus having arrived at the full term; but these variations are of comparatively little importance. Within the limits I have laid down there will be found room for great diversity in the peculiar features of each case, and experience teaches us that scarcely any two labours are exactly alike. First labours are in general more tedious than subsequent ones, at least when the resistance is chiefly from the soft parts.

319. The following table will show the proportional duration of labours:

Authors.	Total No. of Cases.	Terminated in 6 hours.	In 12 hours.	In 18 hours.	In 24 hours.	Above 24 hours.
Dr. Merriman	500	206	398	442	450	
Dr. Collins	15,850	13,012	15,084	15,346	15,586	264
Dr. Maunsel	839	347	647	734	793	36
Dr. Beatty	1182	577	958	. .	1114	69
Dr. Churchill	1285	366	760	. .	1119	166
Dr. Granville	640	. .	515	above 12 hours		104
Drs. McClintock and Hardy	6634	3882	5280	5706	5852	269

In addition to these specific details, I may mention that Dr. Smellie calculated that 990 in 1000 are natural labours: Dr. Leake 900 in 1000: Dr. Bland found 1792 cases of natural labour in 1897 cases: Dr. Jos. Clarke 9748 in 10,199: Dr. Merriman 2607 in 2735: Mr. Lever 4266 in 4666: and Professor Assalini (quoted by Merriman) out of 269 cases reports 205 as "quick and easy."

320. It will be observed that I have inserted a parenthesis in the definition, to the effect that each stage should be in due proportion to the other (*i. e.* the first to the second as 2 or 3 to 1), and this I have done to guard against the error of making time (or the *entire* duration of the labour) our sole standard, instead of symptoms; for a labour may be natural as to time (*i. e.* completed within 24 hours), and yet if the first stage be very short (say one or two hours), and the second prolonged (say 20 hours), the character of the labour may be altogether changed, and the formidable symptoms of powerless labour be developed.

321. Precursory Symptoms.—Before describing the ordinary course of labour, it is necessary to point out certain symptoms which indicate its approach. These vary in intensity in different women: in some they are but slight, and may perhaps pass unnoticed; in others they are very well marked. The most important are,—1, the subsidence of the abdomen: 2, frequent micturition: 3, griping and tenesmus: 4, painless uterine contractions: and 5, mucous discharge from the vagina. Let us examine each of them briefly.

322. 1. *Subsidence of the abdomen.*—We have heretofore seen (§ 157) that at the commencement of the ninth month, the fundus uteri reaches to the ensiform cartilage; but that during the last month it subsides: this is especially remarkable during the last fortnight, and is sufficiently marked to attract the attention of the patient. The uterine tumour becomes apparently less, and sinks forward. It may probably be owing partly to the lower end of the uterus sinking into the pelvis, and partly to some relaxation of the uterine tissue permitting a greater amount of lateral expansion, and a consequent diminution in its height. The tilting forward is owing to a relaxation of the abdominal parietes, and increases in successive pregnancies: sometimes, though rarely, it is so excessive as to require the support of a bandage, and even to retard the first stage of labour by deranging the axis of the uterus.

323. 2. *Frequent micturition.*—In proportion to the enlargement of the uterus, is the pressure exercised by it upon the neighbouring viscera. During the last month, when it sinks down into the pelvis, and falls forward, the pressure upon the bladder is considerable, and its capacity is so much diminished; rendering a frequent evacuation of its contents necessary. In addition, there is a certain amount of sympathy between the uterus and bladder, and an increase of irritability in the latter, on account of which it is less tolerant of the presence of urine than under ordinary circumstances. Its value as a sign of approaching labour, however, is lessened by the fact that it occurs from the same causes, just before the uterus rises out of the pelvis, and that it may be present during several weeks in the latter part of gestation.

324. 3. *Griping, tenesmus or diarrhœa.*—Similar mechanical and sympathetic effects of advanced gestation to those just noticed, may be produced in the rectum and large intestines, and the result will be an irritable state of the bowels, occasional griping pains, and a desire to go to stool, when but little is passed. It must ever be remembered that this frequent passing of a small quantity of fluid fæces, is quite compatible with a great accumulation of fæcal matter above the seat of the irritation, and may often be relieved by a free evacuation. It is an uncertain sign of the approach of labour.

325. 4. *Painless uterine contractions.*—During the last month of gestation, and especially towards its termination, patients frequently notice a squeezing sensation in the abdomen, which lasts for a little time, then subsides, and is not attended with pain. As was remarked by Leroux, if the hand be placed upon the abdomen, the uterus will be felt tolerably hard, well-defined, and tilted forwards. This partial contraction appears in some cases to be excited by the movements of the child. I have never observed it till towards the termination of pregnancy, except in cases of threatened abortion or premature delivery. Velpeau states that the cervix uteri may also be felt alternately relaxed and contracted.

It appears extremely probable that by this painless mechanism, is effected that change in the cervix and os uteri which have been observed to take place previous to actual labour.

326. 5. *Mucous discharge from the vagina.* — This is called "the shows," by nurses: it is generally observed about twenty-four hours previous to the commencement of actual labour, and evidently prepares the passages for the transit of the fœtus. The quantity and quality vary: sometimes the fluid is thin, in other cases thick and viscid, (which Wigand says is more favourable,) becoming thinner at the time of labour; some women have it profusely, others scantily. It is generally colourless until labour has set in; but during the dilatation of the os uteri, striæ of blood are mixed with it, arising from the rupture of some of the small vessels of the cervix uteri.

327. Of these precursory symptoms, it will be remarked, that the first and third only indicate an advanced period of gestation; the fourth, according to my experience, that labour is not far off; but the fifth is the only one which shows that it is close at hand.

In addition to these more marked symptoms, many minor ones might be enumerated; such, for instance, as swelling of the labia and lower extremities, cramps in the thighs and legs, the improvement of the appetite and spirits, diminution of the dyspnœa, a sense of greater lightness and facility of walking, &c.; but these being unequal and uncertain, are therefore of less value.

328. Symptoms of Labour. — I shall now proceed to the description of labour in each stage; first detailing the phenomena, and afterwards prescribing the requisite management. Before I proceed, I should wish to impress upon my junior readers, the extreme importance of carefully and minutely studying the subject of natural labour, not merely in books, which must necessarily be imperfect, but at the bedside of the patient. No case of labour, however simple, can be attended without some addition to our knowledge, if we are vigilant: almost all recent improvements in practice have arisen, and I believe nearly all future ones will arise, from a more perfect knowledge of the natural process, and a more correct appreciation of the natural powers.

As I have already treated of the mechanical and vital agencies employed in effecting delivery, I shall now confine myself to a practical consideration of the results.

329. The commencement of labour is dated by the patient from the moment that the uterine contractions become painful, and correctly so, provided the entire uterus be engaged, if they recur regularly, and continue without suspension. But this is not always the case; the uterus not unfrequently at first acts partially, irregularly, and inefficiently: such efforts are called "*false or spurious pains.*" They arise from various causes, such as over-fatigue, indigestion, constipation, cold, &c., and are occasionally excited by the motions of the child. A little careful observation will enable us to distinguish them from true pains, as they commence about the fundus, and are of limited extent, recur at irregular intervals, are not attended with the mucous discharge from the vagina (§ 326), and do not dilate the os uteri, or protrude the "bag of the waters:" on the other hand, true pains generally commence in the lower part of the uterus, and are first felt in the back, extending gradually to

the front, recurring with regularity though increasing in frequency, dilating the os uteri, and protruding the membranes.

As these false pains may occur at any period of gestation, and sometimes bring on labour prematurely, or when at the full term occasion distress and loss of rest, it is always desirable to relieve them: this may generally be done by rest, if the patient have been fatigued, or by aromatic purgatives followed by an opiate, if the stomach and bowels are deranged.

330. The *true pains* recur at regular intervals, gradually increasing in frequency and power; and each pain from its commencement augmenting in intensity, until having arrived at its maximum, it remains stationary for a short time, and then subsides: thus presenting, as it were, a type of the entire course of the pains.

The pains exhibit, however, different characteristics according to the stage of labour, and have therefore been divided into two kinds, "cutting or grinding pains," and "bearing-down or forcing pains." The "cutting or grinding pains" are indicative of and confined to the first stage of labour, during the dilatation of the os uteri. They are short, severe, and not very frequent, obliging the patient to suspend her occupation, and partially arresting respiration; but not inducing any voluntary efforts. They are generally (but not always) seated in the back, gradually extending round the loins to the abdomen and thighs. The suffering they occasion is very considerable, and although (except in some irritable subjects) it is less than that which accompanies the stronger pains of the second stage, yet it appears more difficult to bear, and the patient gives utterance to groans and loud outcries. The outcry which attends upon the cutting pains, is an excellent diagnosis mark of the first stage of labour, and in some cases we are obliged to depend upon it alone.

331. During the *first stage* we generally find the patient more irritable and restless than subsequently, moving from one place to another, and changing both occupation and position frequently: she is low-spirited and fearful, weeping from dread rather than suffering, anticipating evil, and scarcely to be comforted. This distressing state disappears, however, as the labour advances. In some cases the despondency which has darkened the last few months of pregnancy, is exchanged for cheerfulness and courage the moment labour sets in. In general I have remarked, that, whatever the mental condition may have been during pregnancy, and even the first stage of labour, the violent pains, severe suffering, and hard work of the second stage, occupy the mind as well as body, to the exclusion of desponding anticipations, and, as it were, rouse up all the patient's energy and courage to meet the exigencies of the case. A singular deviation from mental integrity, apparently from extreme suffering, has been the subject of a valuable essay by my friend Dr. Montgomery,—I allude to the partial and temporary delirium which occurs occasionally, just as the head is passing through the os uteri or os externum. It seldom lasts more than a few minutes, and in one case I attended, the patient was conscious of talking incoherently, but felt quite unable to arrest herself.

332. During the first stage of labour, and especially at the time the head passes through the os uteri, severe rigors occur; not from cold, as they are observed equally when the patient is warm, but as a prelude to a pain. The surface is generally of the usual temperature and free from

perspiration, at least till near the end of the stage. The pulse is seldom permanently quickened until the second stage; although, as Hohl has remarked, if it be carefully examined it will be found to become more frequent during the first part of a pain, then to remain stationary for a moment, and afterwards to subside.

During this stage also, the stomach is apt to become irritable and discharge its contents, probably from sympathy with the uterus, rather than from mechanical pressure, as the abdominal muscles are as yet inactive. This is always beneficial, as it not only removes indigestible matters which may be in the stomach, but certainly relaxes the cervix uteri.

333. If the hand be placed upon the abdomen when the pains come on, the uterine tumour will be observed to contract, become hard, and tilt itself forward, so as ultimately to bring the axis of its cavity into complete accordance with that of the brim; and after remaining in this state for a longer or shorter time it relaxes, but does not quite return to its pristine flaccidity.

The results of auscultation are very interesting: M. Hohl in his work "Die geburtshülfliche exploration," pt. i. § 105, thus describes them: "If we direct our attention to the changes of tone which the uterine pulsations present, we shall find them generally stronger, more distinct, and varied in tone during labour, and this is especially the case just before a pain comes on. Even if the patient wished to conceal her pains, this phenomenon, and more especially the rapidity of the beats, would enable us to ascertain the truth. The moment a pain begins, and even before the patient herself is aware of it, we hear a sudden short rushing sound, which appears to proceed from the liquor amnii, and to be partly produced by the movements of the child which seems to anticipate the coming on of the contraction; nearly at the same moment all the tones of the arterial pulsations become stronger; other tones, which have not been heard before, and which are of a piping resonant character, now become audible, and seem to vibrate through the stethoscope, like the sound of a string which has been struck and drawn tighter while in the act of vibrating. The whole tone of the uterine circulation rises in point of pitch. Shortly after this, viz., as the pain becomes stronger and more general, the uterine sound seems, as it were, to become more and more distant; until, at length, it becomes very dull or altogether inaudible. But as soon as the pain has reached its height and gradually declines, the sound is again heard as full as at the beginning of the pain, and resumes its former tone, which in the intervals between the pains, is as it was during pregnancy, but somewhat louder."—(*Rigby.*)

334. An *internal* or *vaginal* examination reveals to us the condition of the passages, the state of the os uteri, and the rate of progress. At an early period, the vagina will be found cool, moist or dry, and undilated, of nearly the calibre it was before labour commenced; as it advances, however, even during the first stage, the entire canal becomes more flaccid, and if not dilated, at least relaxed and dilatable. The os uteri is high up, but not always in the same situation; in first labours it is nearer to the promontory of the sacrum than the symphysis pubis, in subsequent confinements this is often reversed. The lips of the orifice are sometimes soft and thick, in other cases hard and thin; the former dilate more readily, and the latter generally become softer and thicker before dilatation takes

place. At the commencement of labour the orifice will readily admit the point of the forefinger, and by the repeated pains it is gradually widened so as to allow the child to pass. The rate of dilatation is slowest at the beginning; it is said, and I believe truly, to take as much or more time to dilate the os uteri to the size of half-a-crown, than to complete the process; and for a very evident reason, viz., the want of a mechanical dilating force (§ 302); the bag of the waters not being protruded until some progress has been made.

If the finger be maintained in the orifice during a pain, we feel the circle tighten and become hard, until the head presses upon the cervix; after which time the lips are retracted by each contraction. We ascertain the progress of the labour, by carefully estimating the advance made by each pain.

335. Towards the end of the first stage, or at the time when the os uteri is pretty well dilated, we remark an increase of the sanguineous striæ in the vaginal discharge and the accession of voluntary efforts; slight at first, but gradually increasing. About this time generally, the membranes give way, the liquor amnii escapes, and by the next pain the head passes through the os uteri and enters upon the *second stage*.

The phenomena are now somewhat changed, especially in their intensity. The pains are more frequent and longer, the intervals shorter, and the suffering greater in general; but owing to the necessity of fixing the chest as a fulcrum for muscular exertion, the breath is suspended during a pain, and the outcry suppressed except at its termination. The character of the outcry is therefore as good a test of the second stage as of the first. At the accession of each pain the patient holds her breath, and seizing hold of something with her hands, brings the muscles of the extremities, of the back, and abdomen, to aid the expulsive efforts of the uterus. These are the "bearing-down pains" of the second stage.

It is not easy to explain the change in the character of the pains, nor why straining should occur only in the second stage. Wigand attributes it to sympathy between the os uteri and vagina, and between the abdominal and other muscles. It certainly cannot be merely owing to the presence of the fœtal head in the vagina.

Further, the arrest of the circulation from the suspension of respiration, distends the cutaneous vessels, the surface becomes florid, the face almost purple, the veins of the forehead, temples, and neck are distended, and the eyes are bright and prominent; the heat of the skin is greatly increased, and a profuse perspiration ensues. The pulse, which was quiet during the first stage, or at most quickened during a pain, is now increased in frequency during an interval, and the changes noticed by Hohl are very remarkable during the pains; *i. e.* it becomes more frequent at the setting in of each pain, until it attains its maximum rapidity, at which it remains for a short time stationary, and then subsides. At the termination of the second stage, it will generally be found to range between ninety and one hundred and twenty beats in a minute.

336. Vomiting also frequently occurs; but in the second stage it is as much the result of pressure as of sympathetic irritation, and it is generally favourable, as it seems to relax the soft parts. However, as it is a symptom developed also in unfavourable cases, it may be well to observe, that it may reasonably excite uneasiness when it comes on (during this stage)

after the sudden cessation of uterine action; when symptoms of fever, such as rapid pulse, furred tongue, heat of skin, &c., are present; when it is accompanied by abdominal tenderness; and especially if the fluid be sanguineous or dark-coloured.

If the second stage be prolonged, the patient often feels heavy and sleepy, and may doze between the pains,—the result of the fatigue, combined with the congestion about the face and head. Under ordinary circumstances this need excite no uneasiness, as the patient is refreshed by it; but if it be excessive and accompanied with headach, especially in primipara, we must be watchful, and on our guard against an attack of convulsions.

As the head advances through the pelvis, it presses more or less upon the nerves which pass through that cavity to the lower extremities, and gives rise to spasms and cramps, which add to the suffering of the patient. They may be partially relieved by friction.

The pressure of the head also evacuates the contents of the rectum, but effectually prevents the emptying of the bladder.

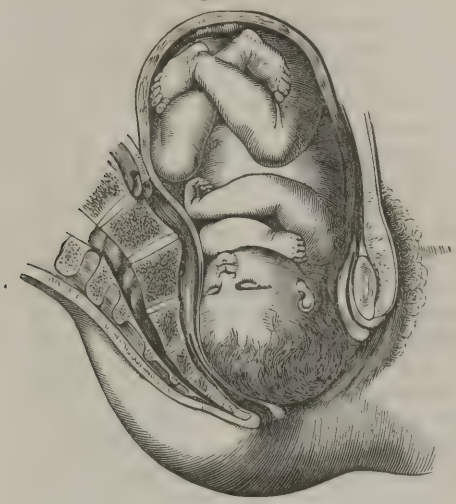
337. If an *internal* examination be made at the beginning of the second stage, we shall find the vagina dilatable, and as though it had been dilated, its walls rugous and flabby, and prepared to yield to the pressure of the head. The head itself will be perceived at the upper part of the pelvis, filling it more or less completely, descending with each pain, and receding at its conclusion; the advance exceeding the recession, and the excess marking the rate of progress of the labour. At a later period, the head will be felt on the floor of the pelvis, where it meets with considerable resistance, but which is overcome by the mechanism already described (§ 302); we observe the same repeated advance and recession, the head each time propelled a little further than before, and often with a kind of spiral movement, until after a time proportioned to the difference between the force employed and the resistance, the obstacles yield, and the head presses upon the perineum, which undergoes the same process of dilatation.

338. At this period of the labour, when the head is distending the perineum and dilating the external orifice, both the suffering and the exertion reach their maximum point; and yet it is beautiful to observe how cautiously (so to speak) and how securely the process is effected. Adequate expulsive force is called into action; and if it were continuous, nothing could save the patient from injury; but each pain is just long enough to gain upon the advance made by its predecessor; and the head detained for a few moments at its furthest point of advance, then recedes; and this is repeated until the perineum is completely softened, and the os externum dilated. Nor is this all; the resistance offered by the perineum carries the head forward, so that its lowest point (the tumour) shall press against the os, and by the time the perineum yields, the orifice is sufficiently wide to secure the proper direction of the head in its transit.

At the latter part of the second stage, the pains are often what is called "double;" *i. e.* they succeed each other so quickly, that a new one commences before the former has quite terminated. At length the force conquers all resistance, and with a throe of agony the head is expelled; after which there is a short rest, equal to two or three pains, then the uterine power is again exerted to expel the body of the child.

The second stage is now completed; the suffering, which was intense, is exchanged for perfect ease, and the sense of relief is inexpressibly great. If the hand be placed on the abdomen, it will be found flabby, and the uterus large, and moderately contracted.

Fig. 86.



339. The *third stage* of labour includes the detachment and expulsion of the placenta. In some cases, the contractions which expel the child, expel the after-birth. In most cases, however, it is partially or wholly detached, remaining in the uterus or vagina, from whence it may be expelled by the natural powers alone, or aided by gentle traction.

The interval which elapses after the expulsion of the child, before the uterus again actively contracts to expel the placenta, varies somewhat in different cases, apparently according to the fatigue that organ has undergone. Dr. Clarke found the average interval to be twenty minutes. Out of 277 cases which I have accurately noted in my own private practice, I find that in 176 the placenta was expelled in (within) 5 minutes; in 60 cases, within 10 minutes; in 14, within 15 minutes; in 11, within 20 minutes; and in 16, within half an hour.

Where due attention has not been paid, the interval will be longer; but from the above data we may conclude with the highest authorities, that in natural labour, the placenta ought to be expelled within an hour or an hour and a half, and that when the interval exceeds this, the case fairly comes under the order of "retained placenta," of which I shall treat hereafter.

When this interval, whatever it be, has elapsed, the uterus again contracts, but much less forcibly, and by one or two pains, the connection between the placenta and uterus is severed, the now useless appendage is extruded into the vagina, and by the contraction of this canal is expelled, with a gush of blood or clots (*dolores cruenti*). The bag of the membranes is generally turned inside out, especially if the after-birth have

been extracted by pulling the cord, and the situation of the perforation in the membrane through which the child passed, will enable us to estimate the distance of the placenta from the os uteri; the distance of the perforation from the placenta being exactly the same as the distance of the latter from the os uteri.

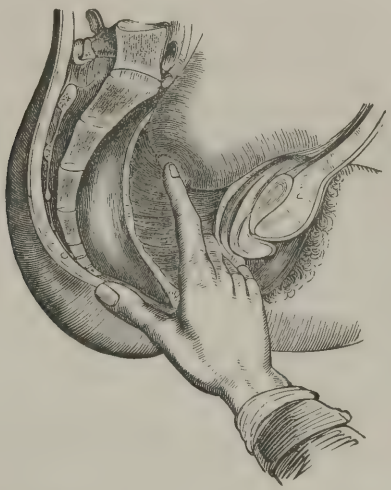
340. Management of natural labour. — Let us now turn from the description of the phenomena of natural labour to a consideration of the duties of the attending accoucheur, and the mode of managing such cases. I have already stated that most of the modern improvements in midwifery have resulted from a more correct appreciation of the natural powers; so in the management of natural labour, the great improvement has been the absence of interference. There is, in truth, but very little for the accoucheur *to do*, if the case be natural and the circumstances favourable, and very little that he needs, except patience and gentleness, and therefore the old practice of carrying certain instruments and certain medicines about with him, is strongly to be deprecated, as, to say the least, a needless exposure of himself to temptation. All the surgical appliances needed are, an elastic-gum catheter (male) and a lancet; and if in the country, a small quantity of laudanum. He ought also to be provided with a few strong pins, and some ligatures of twine or tape; and if there be a prospect of much delay, he will not be the worse of a book in his pocket, provided that it be not a treatise on midwifery! But to return: although there is little to do in a natural labour, we cannot of course *assume* that any case to which we may be called is of this class, without inquiry; our first object, then, when summoned to a patient is to ascertain her *present state*, whether she be in labour or not, &c.; if she be, the *presentation* and *position* of the child, the *rate of progress* and *probable termination* of the labour.

341. As to the present state of the patient, a careful examination of the bodily functions generally, and of the pulse, tongue, skin, &c. will show whether the patient is in ordinary health, or whether we may have to contend with any complication, as fever or organic disease; and the information may enable us to anticipate, and perhaps prevent some attacks. A more minute investigation must be instituted into the state of the uterine system, as to the presence of real pains; their frequency, force, and regularity; the character of the outcry, the amount of voluntary effort, the quantity and quality of vaginal discharge, &c. By these symptoms, we shall be able to form an opinion as to the existence of labour, the stage and rate of progress, and the preparedness of the passages, &c. and also as to the propriety of seeking for more special information, by means of a vaginal examination. This will add to the information previously acquired, a knowledge of the presentation and position.

342. It is not possible to fix a definite time for this examination; for in many cases, it will depend upon the patient. It may, however, be stated generally, that it is satisfactory to make it as early as convenient, and that certainly no time should be lost after the escape of the waters, lest we miss the best opportunity for rectifying a mal-presentation. Further, the attendant should never leave his patient for more than a few minutes, unless he has ascertained that all is right. The frequency with which it should be repeated must depend chiefly upon the rate of progress. During the first stage (judging by the outcry and cool skin) it is scarcely

necessary, if once we have ascertained that all is right; but during the second stage, it may be repeated according to the rapidity of the advance, every four, six, eight, or ten pains; and when once the head distends the perineum, the accoucheur should keep his finger upon the head during each pain, so as to regulate the support necessary for the perineum. To the junior student only, can any directions as to the mode of making an examination be necessary, and they may be brief. The patient should lie upon her left side, with the hips near to the edge of the bed, and the knees drawn up towards the abdomen. The forefinger of the right hand

Fig. 87.



(or two fingers, and in some cases, those of the left hand) having been well oiled or soaped, should be passed along the perineum, and into the vaginal orifice; it is then to be directed upwards and backwards, towards the promontory of the sacrum, until the os uteri or the presenting part be found. Having done this, we shall be able to estimate the calibre, heat, and moisture of the vagina, the dilatability of the os uteri, the resiliency and general condition of the cervix, as well as the actual dilatation by the bag of the waters, or the fœtal head, during a pain. If the membranes be entire an experienced finger will in most cases detect the presentation; if they have given way, this will be much more easy and certain; and if it be the head, by finding the fontanelles and comparing their situation with certain parts of the pelvis (§ 307) the position may be determined.

It is generally recommended to introduce the finger during a pain, as less unpleasant to the patient; but the examination must occupy both a pain and an interval, if we hope to obtain full information. A comparison of the knowledge thus obtained, with the frequency and force of the pains, will enable us to estimate the *rate of progress* of the labour; and these results, combined with the local and general condition of the patient, will afford adequate grounds for our *prognosis*. In conclusion, I would earnestly recommend to my junior readers to take every opportunity of

passing the catheter and making vaginal examinations in the dead subject as well as the living.

343. We will now suppose that the conclusion from these investigations is favourable, that the patient is in good health, is really in labour, that the head presents, and that she is making a sufficiently rapid progress, with every prospect of a safe termination.

It is not necessary, during the first stage, that the accoucheur should stay in the room with the patient, nor even in the house, if the progress be slow; before leaving her, however, he must be certain that all is right, that everything is in readiness; and he must give some general directions to the nurse. The patient is better out of bed during the early part of the labour, if it happen in the day-time, as she will be less fatigued, and probably less impatient than if she lay in bed the whole time; she may rest on the sofa when tired, and occasionally walk about, or pursue any slight occupation if she be able.

It is very desirable to keep her tranquil and cheerful, for which purpose she should be told of all that is favourable in her case, and all subjects calculated to depress should be avoided. In this matter much depends on the nurse, who should receive proper cautions. I am satisfied that in most, if not in all cases, it is better to deal frankly with our patient, and not to make false promises in hopes of encouraging her to bear the pains. Let her be told that all is favourable, and that, as far as we can judge, the labour will terminate safely for herself and her child, and she will bear to be told, that she has yet some time to suffer. Moreover, as it is impossible to calculate with accuracy upon the duration of a labour, an assurance that it will be over in a certain time will, in all probability, issue in disappointment; and if so, in distrust either of our truth or skill. I have dwelt upon this the more, because nothing is more common than for the patient to beg of the attendant to say how long she will have to endure the pains.

During this first stage the patient may be allowed her usual diet, but without stimulants, as it is rather advantageous to have the stomach occupied. The bowels should be freed by medicine or enemata, if necessary, and the urine regularly evacuated; and it may be as well to put my junior readers on their guard against a frequent error of nurses, in confounding the dribbling of the liquor amnii, after the rupture of the membranes, with "passing water." I need not say that this may take place, and yet the patient suffer from retention of urine.

344. The patient should be cautioned against making any voluntary effort during the first stage; at least, until obliged by the increasing violence of the pains, as no effort can at this time hasten the labour. "Women," says Dr. Denman, "may be assured that the best state of mind they can be in at the time of labour, is that of submission to the necessities of their situation; that those who are the most patient actually suffer the least; that if they are resigned to their pains, it is impossible for them to do wrong, and that attention is far more frequently required to prevent hurry than to forward a labour."

Neither is it necessary, as was formerly taught, for the accoucheur to endeavour to hasten the labour by manual dilatation of the os uteri or passages; such an "abominable custom," as Denman justly calls it, would rather have the effect of retarding the labour by the irritation it would oc-

casion, and might, as in a case I recently witnessed, give rise to inflammation, and sloughing afterwards.

345. Among the matters which should be in readiness, are two or three short pieces of tape or twine, for tying the navel string, a pair of scissors, some strong pins, and a binder. The latter should be made of a double of diaper, nearly half a yard wide, and long enough to go round the hips, and to allow for pinning over. These things ought to be provided by the nurse; but as labour sometimes occurs unexpectedly, or the nurse may be forgetful, it is well for the attendant to have a supply of twine and pins, with a pair of scissors, in his pocket-case. Towards the end of the first stage, it is customary for the nurse to "make the bed," which is done by placing a skin of leather, or a square of oiled silk over the mattrass, to protect it, at that part of the bed which will be occupied by the patient's hips; over this is placed the under-blanket and sheet, and upon these, two or three sheets folded square, on which the patient is to be placed. These folded sheets will absorb most of the discharges, and can afterwards be removed without disturbing the patient, leaving dry bed-linen underneath. The skin or oiled silk is allowed to remain for some time longer.

346. Soon after the second stage of labour has set in, the patient (especially if she have borne children before) should undress, and go to bed. The position for delivery has varied in different times, and still varies in different countries. In the earliest times the sitting posture was preferred; and in Ambrose Paré, Deventer, and other old writers, we have a description and plates of labour-chairs, one of which the late Professor Hamilton used to exhibit to his class. In China and Cornwall the patient is delivered upon her knees, or leaning over something. In France and some parts of Germany, the woman is placed upon her back, with the knees drawn up; but serious objections exist to either of these plans; by far the best and most natural position is the one now adopted almost universally in Great Britain and in many parts of the Continent; viz., on the left side, the hips being close to the edge of the bed, and the knees drawn up towards the abdomen. It is usual to place a pillow between the knees to keep them separate, but I cannot say that I think it is of any service. The patient's night-dress should be drawn up underneath her, beyond the hips, to escape soiling; and she may be allowed to grasp a sheet fastened to the bed-post, or, what is much better, the hand of an attendant.

But although I have advised that the patient should lie down soon after the commencement of the second stage, it is not necessary that she should remain in the one position the whole time, provided that it be assumed before the head presses upon the perineum.*

347. In most cases the liquor amnii escapes about the beginning of the second stage, but occasionally, when the membranes are unusually tough,

* The position upon the left side, with the knees drawn up, is that almost universally directed by American accoucheurs, and it is certainly the one which is the most convenient to the practitioner, and productive of the least possible exposure of the female's person. It is only, however, when the labour is proceeding rapidly that it is necessary for the female to retain, uninterruptedly, the position described. Change of position, or even rising from the bed and sitting in an easy chair, in cases where the labour is proceeding slowly, will conduce to the comfort of the patient, while, at the same time, it will often prevent injurious consequences from the heat, pressure, and constraint resulting from long continuance in one position. — EDITOR.

they remain entire until the head has cleared the os uteri, or even, but more rarely, until it is passing through the os externum. When we are quite satisfied that the head has passed through the os uteri, we may rupture the membranes, by pressing the finger against them during a pain, as their integrity is an impediment to the advance of the child after this time; but it should not be done hastily, nor until we are certain that their usefulness is at an end. When the patient becomes hot, the bed-clothes should be lightened, and the room at all times be kept pleasantly cool and fresh. Food cannot be taken at an advanced period of the labour, but warm drink, such as whey, gruel, or tea may be allowed.

348. When the head is on the floor of the pelvis, the accoucheur should take his place by the bed-side, and examine gently during each pain for the purpose of deciding when it is necessary to support the perineum. The object in supporting the perineum is twofold; first, to afford a moderate counterpoise externally to the pressure exerted from within, so as to prevent the structures yielding under sudden or severe pains; and secondly, to prolong (as it were) the curve of the sacrum, and so make certain of the head being carried forward to the orifice of the vagina, instead of being forced through the perineum for want of such impulse anteriorly. Now to fulfil these two objects, it is clear that we need not interfere at all until the perineum is fully distended and protruding; but when we find this to be the case, then we should cover the left hand with a soft napkin, and apply it along or across the perineum, commencing at the coccyx, and reaching to the anterior edge. The amount of pressure needed is but little, no attempt must be made to retard the progress of the head; but whilst the perineum near the coccyx is firmly supported, the more anterior portion should be left free to yield before the pressure of the head. Neither is the skin to be retracted when the head presses through the orifice, but rather carried forward, so as to lessen the chance of laceration.

Either hand may of course be used; I prefer the left, because it leaves the right at liberty to examine, and to receive the head of the child.

Let me repeat, that to make our assistance useful and not injurious the support should be moderate, equable, and rather firmer near the coccyx (but yielding as that bone yields), than towards the anterior edge; that it need not be afforded until the perineum protrudes; that then it should be afforded during each pain, and until the pain has entirely ceased. I really believe that it would be better not to touch the perineum than to make injudicious pressure; it has been my lot to witness more than one case where rupture was owing to excessive and injudicious support.

349. As the head passes through the vaginal orifice, the accoucheur should receive it into his right hand, allowing it to make the usual rotation, and carrying it forwards as the pains expel the shoulders and body of the child. The left hand must be employed in supporting the perineum as the shoulders press forward. When the head is expelled, the nurse should be directed to make gentle steady pressure upon the uterus, and to follow it down, keeping her hand firmly upon it until the binder is applied; by so doing, we shall rarely have any trouble or delay with the after-birth.

When the child is born, its mouth should be examined, and any mucas that may have accumulated in it removed.

It not unfrequently happens (§ 181) that the funis is coiled around the child's neck, and fears have been expressed of its retarding the expulsion of the body, or causing the rupture of the cord, or the inversion of the uterus. These fears I believe to be unfounded, for extensive researches show that the funis is never twisted round the neck, unless it be beyond the ordinary length, and yet the ordinary length is sufficient to permit the birth of the child, after deducting the amount lost in the coiling. A very few cases are on record of cords so short (six or eight inches) as to require division, before the child could be delivered; but in ordinary cases, if we find on examination with the finger when the head has escaped that the cord is twisted round the neck, all we need do is to draw down more of the cord, and either slip the loop over the head or shoulders. If we cannot do this, we must loosen the cord as much as we can, so as to prevent the strangulation of its vessels, and then wait for the uterus to expel the child.

350. There is generally a short interval after the head is born before the pain expels the body, and it occasionally, though seldom, happens, that this interval is prolonged to the manifest risk of the child, which becomes livid and swollen, making vain efforts to breathe. If it be allowed to remain thus, it will die of apoplexy; but, on the other hand, if we extract it hastily without uterine action, there is danger of hemorrhage. Under these circumstances, we have the choice of two evils, and must choose the least; the nurse should be directed to use friction over the uterus, and if this fail in exciting it to action, she must make firm pressure on the uterus, whilst the accoucheur takes hold of the child's head, and inserts a finger into the axilla, and gently extracts the body. The hemorrhage may be prevented by pressure, but nothing can save the child but removal. I have repeatedly acted thus, and without any ill consequences.

351. If the child be healthy, and have not suffered from pressure, &c. it will cry as soon as it is born, and when respiration is established, it may be separated from the mother, rolled in flannel, and removed. This having been done, the hand should be placed upon the abdomen to ascertain (from the size of the uterus) whether there be twins; if not, we may proceed to apply the binder, which should embrace the hips inferiorly and the whole abdomen. It should be pinned firmly, but not too tight, and be kept on during the whole time the patient is in bed. I do not know that we consider the binder absolutely necessary. Dr. Davis states that he has not used one for fifteen or twenty years, except in cases of flooding; it is, however, very useful at first in maintaining a certain degree of contraction of the uterus, and giving support to the abdomen, and afterwards in promoting a return to the natural condition of the uterine and abdominal parietes; for which reason I think it deserving of rather more attention than is usually paid paid to it, at least after the first day or two. I believe that if it be duly applied during the time the patient keeps her bed, she will avoid that loose state of the integuments which gives rise to what is called "pendulous belly."

352. When the binder is applied, the patient may be allowed to rest awhile, if there be no flooding; after which, *when the uterus contracts*, gentle traction should be made by the funis, to ascertain if the placenta be detached; if so, and especially if it be in the vagina, it may be removed by continuing the traction steadily in the axis of the upper outlet at first, at the same time making pressure upon the uterus; if the cord do not

yield, the after-birth is not detached as yet, and *no force must be used.* A little patience, with occasional friction to the uterus, will be all that is necessary.

After the placenta has been expelled or withdrawn, the binder may be tightened if necessary, and a warm napkin applied to the external parts. The soiled sheets underneath the patient may be removed, and the night-dress drawn down; but no further change should be made for two or three hours, as it is most important for the patient to avoid all exertion at this time. In some places and with some practitioners, it is customary to give stimulants on the completion of labour; but it is quite unnecessary in ordinary cases, and may do mischief. Rest and quiet are the best and only necessary restoratives. A still stronger objection exists in my mind against the practice of giving a dose of laudanum, unless specially called for, as it may suspend the uterine action, and give rise to hemorrhage. We may depend upon it that nature is fully equal to the emergency, and that the less we interfere the better for our patient; in the words of an eminent writer, "Meddlesome midwifery is bad."

Although our duties are now ended as far as the mother is concerned, we should allow an hour to elapse before leaving the house, and before we go, we should carefully examine the surface, pulse, uterine tumour, &c. and ascertain from the nurse the amount of discharge, so that we may be satisfied that all is right, or if wrong, that we may remedy it promptly. We ought also to visit the patient after six or eight hours to see that the progress of the convalescence (to be presently described) is favourable.

353. Now let us return to the child; after waiting until respiration is fully established, or until the pulsation in the cord ceases, a ligature is to be placed upon the funis about two inches from the navel, and a second a few inches further on; and the cord divided between the two by the scissors. Some foreign writers object to the ligature as unnecessary, and the case of animals has been brought forward as a proof; but Dr. Hunter has shown that this mode of dividing the funis prevents hemorrhage by the "torsion" exerted upon the vessels, and most practitioners of any standing, must have met with cases where hemorrhage occurred in spite of a ligature; so that in these countries the propriety of the practice is generally admitted. The second ligature is added to prevent mischief, if there should be a second child with a vascular communication (as sometimes happens) between the two placentæ. Dr. Dewees objects to this, on the ground that the loss of blood hastens the extrusion of the placenta. The end of the funis should always be examined before the child is dressed, and if any oozing have occurred, an additional ligature must be applied nearer to the umbilicus. This fragment of the funis gradually dries up, withers, and falls off on the fifth or sixth day generally, though the time may vary from the second to the fifteenth day.

354. Thus far I have described the ordinary management of ordinary cases both as regards mother and child; but there are not unfrequently slight deviations from this simple course, and some of them, as regards the child, must now be noticed. For instance, when born it may be in a state of *defective vitality*, *asphyxia*, or *apoplexy*.

1. It may be in a state of anemia, syncope, or asphyxia, from uterine hemorrhage, too early detachment of the placenta, or defective nutrition. In these cases very feeble, if any, efforts at inspiration take place, there is

no pulsation in the cord, and the action of the heart is very weak. There is consequently no object in preserving the utero-fœtal connexion; the funis should be tied and divided, and the child plunged into a warm bath: if this fail, cold effusion must be tried; but that which I have seen most effectual is light and rapid friction of the body and extremities with warm flannel, with or without stimulants. Tickling the nose or fauces with a feather, electricity, and stimulating enemata have been recommended; but I am not aware that they have been very successful. Inflation may be tried by means of a proper tube introduced into the larynx, or a flexible catheter passed through the nose, and with greater prospect of success than most of the other means. Great care must be taken to introduce the instrument cautiously and correctly, and to inflate slowly and gently.

2. In other cases, the child may be in a state of oppression or asphyxia from prolonged labour, or from some deviation from the normal presentation, &c.; but in such instances the pulsations of the funis, though weak, are perceptible, the colour of the surface is natural, and the shape of the head is unaltered. Here it would evidently be wrong to divide the cord until respiration has been established; therefore, placing the infant in such a position that there shall be no impediment to the circulation through the cord, we must adopt some of the plans already mentioned, for its restoration. Friction with hot flannel, warm baths, aspersion with cold water, stimulants to the surface, or inflation may be in turn tried, until the child makes an effort to breathe. When it has fully recovered, the cord may be tied and divided. If these means fail, we may try the effect of loss of blood by cutting across the cord and allowing a dessert or table spoonful of blood to escape before applying the ligature. Should this not succeed, the case is hopeless.

3. There is a third class of cases, when the child is threatened with or attacked by apoplexy, from prolonged labour, the pressure of a narrow pelvis, or (as already noticed) from an interval elapsing between the birth of the head and body. In such, the heart's action is laboured, the pulsation in the cord feeble and oppressed, the surface blue, the face livid, and in some cases the form of the head is changed. The treatment is exactly the opposite of that for the first class of cases; unless the circulation be relieved, the infant will die of cerebral oppression or apoplexy; therefore the first thing to be done is to divide the cord, and allow from half an ounce to an ounce of blood to escape; after which, we generally find the surface paler, the pulse quicker and firmer, and an effort made to respire; the cord may then be tied. If respiration do not take place, cold sprinkling, warm baths, friction or inflation may be tried.

I have only to add, that in all these cases we should not be easily discouraged, but continue our efforts for a considerable time, as we often succeed after a longer time than we should have believed possible.

355. The tumour of the scalp, already noticed, subsides in a very short time, without requiring any application in most instances; other cases, however, are not so tractable. The more simple tumours consist of serum effused underneath the scalp; others, of serum mixed with blood: again, in more rare cases, we find blood effused under the pericranium; and lastly, in addition to the blood effused, the pericranium appears to secrete a ridge of bony substance limiting the effusion. These *cephalæmatoma*,

which are very rare, are about the size of an almond, apparently not painful, and may be distinguished by their persisting for several days, and by the semicircular ridge or boundary, which can be felt by the finger. No doubt they are the result of pressure; but they do not disappear as do the other forms of tumour. Spirit or stimulating lotions may be used, and in some cases they will be successful; in others it will be necessary to lay open the tumour and apply simple dressings. The reader may consult upon this subject, essays by Wagstaffe, Gedding, Naegelè, &c., and the works of Osiander, Michaelis, Grœtzer, and Valleix.

356. The only remaining deviation from the normal condition of the infant which I shall notice, is the hemorrhage which sometimes takes place from the navel from incomplete closure of its vessels on the separation of the remains of the funis. Fortunately it is not of frequent occurrence, as it is very difficult to arrest it, and I believe in most cases the result is fatal. Compresses of every kind, escharotics, and even the actual cautery have failed. Dr. Stewart advises that the navel should be filled with alum or some astringent, and a compress placed over it. Mr. Pout and Dr. Radford propose to cut down upon the vessel and tie it.

I would venture to suggest that the navel should be stretched open and filled with plaster of Paris, either dry (in powder) or moistened; it would become solid in spite of the hemorrhage, and would, I think, effectually plug the vessels.

CHAPTER IV.

CONVALESCENCE AFTER NATURAL LABOUR.

357. The history of natural labour would be incomplete did we not say something of the state of the patient after delivery, both as to the effects produced, the gradual restoration of the parts engaged, and the requisite treatment.

If we examine the condition of the patient a few hours after delivery, we find a considerable change both locally and generally, and which cannot be attributed to mere fatigue. The nervous system is more or less affected; the secretions are altered, and new ones established; the condition of the uterine system itself, and in its relations, is completely changed, the circulation disturbed, &c. &c.

Let us briefly examine these peculiarities separately.

358. 1. The *nervous shock*. — The sudden alteration of the eye, the diminished or increased sensibility of the brain, the disturbance of the respiratory and circulating system, the altered secretions, the great exhaustion, &c. are all evidences of a shock to the nervous system, the effects of which are thus extensively felt. After easy labours the shock is not very remarkable, and the patient soon recovers from it; but it is too manifest to be doubted after those of a more serious character. I cannot agree with those who attribute the state of the patient to fatigue, and I am happy to have in this opinion the support of the late Professor Hamilton

of Edinburgh, who in his Practical Observations distinctly recognises this nervous shock as an effect of labour.

When it is moderate, it gradually subsides, if the patient be kept free from all excitement and disturbance, and obtain a few hours' sleep. In proportion to the rapidity and completeness of its subsidence, will be the return of comfort and health to the patient.

359. 2. The *state of the circulation and respiration.* — The changes induced in these systems appear to be the combined result of the nervous shock and muscular exertion. From extensive investigations I have obtained the following results. During the second stage of labour, the pulse (as already noted) always increases in frequency, though the amount varies in different persons. Shortly after delivery it falls, nearly, but not quite, in proportion to its previous frequency, *i. e.* it descends nearly as much below the ordinary standard as it was above it. After the lapse of a few hours, a reaction takes place, the amount of which is nearly, but not quite, in proportion to the original increase and subsequent collapse. Again, after twelve or fourteen hours it subsides, to be again increased on the secretion of the milk; after which, if the patient go on well, it gradually returns to the ordinary standard. To illustrate my meaning, let us suppose that during the second stage the pulse mounts up to 120; then, during the collapse, it will fall perhaps to 60; and, on reaction taking place, it will rise to 100 or 110. I do not intend to give this illustration as the accurate standard of these changes, but merely as illustrative of the alternations I have generally observed; nor do I say that they occur in every case, but only that I have noticed them in a very large majority.

I have never been able to discover any proportion, between the frequency of pulse induced by the secretion of milk, and its previous state.

The importance of these successive alternations will be seen more strikingly, when we come to consider the variations from normal convalescence; it may suffice to say, that I have seldom seen them absent (the pulse having increased during the second stage) without serious cause.

The frequency of respiration after natural labour is in accordance with that of the pulse, when the nervous shock has been moderate. During the increase of the circulation, the number of respirations per minute is increased, and again diminished during the collapse.

360. 3. *State of the uterus, vagina, &c.* — Immediately after delivery, the uterus contracts more or less firmly, so as to reduce its size to about that of an infant's head. This contraction is beneficial in several ways: it prevents hemorrhage, it empties the uterine cavity, and diminishes the calibre of the uterine vessels and sinuses. After a short period of contraction, an interval of relaxation ensues, followed in its turn by renewed contractions. The repeated contractions reduce the size of the uterus gradually, until about the eighth or tenth day, it is small enough to descend into the pelvis. Previous to this, it can be examined through the relaxed abdominal parietes, and a tolerable accurate knowledge obtained of its condition; but subsequently we can only reach the fundus at the brim of the pelvis; and after another week it disappears altogether. Some, as Murat and Ramsbotham, attribute this rapid diminution in size to uterine contraction alone; others conceive, with Dr. Hamilton, that absorption goes on rapidly at the same time. The decision of this ques-

tion mainly depends upon another, viz. whether during gestation new matter is actually added. If so, no doubt, contraction alone would not be sufficient to explain the change after delivery.

361. The condition of the cavity of the uterus is of great interest. When examined a day or two after delivery, the lining membrane appears loose and corrugated, somewhat softened, and covered more or less by patches of the decidua. The part to which the placenta was attached, is raised above the level of the surrounding parts; its surface is unequal, resembling in this respect a granulating ulcer; its size is wonderfully reduced. The whole internal surface is of a dark ash colour, while the discharge upon it may be greenish or brownish, giving the appearance of a morbid condition of the parts — indeed I have known it pronounced to be gangrene. The structure of the uterus, if cut into, is found to be less dense than natural, and the fibres more distinct; the sinuses are still very evident, and at the placental insertion they are filled with clots of blood. The os and cervix uteri are covered with ecchymoses, as though they had been severely bruised; and sometimes small lacerations may be observed in the margin. The orifice remains open for some days, but gradually closes.

The *vagina* is speedily reduced in size after its great distension: at first there is considerable heat and soreness; but this shortly subsides, unless the head of the child have remained long in the pelvis, or the lochia be acrid. The lower outlet, too, resumes its natural capacity in a shorter time than would have been believed possible.

The abdominal integuments are longer in resuming their natural state; they remain flaccid and loose for a considerable time; but if care be taken in the bandaging, but little evidence, beyond the presence of the white streaks, is afforded after a month or two, of their previous distension.

362. 4. *After-pains.* — The contractions of the uterus, subsequent to delivery, of which we have spoken, are unaccompanied by pain in primiparous women; but in subsequent labours they cause more or less suffering, and are called "after-pains."* They vary a good deal in their frequency, their severity, and their duration. The first is generally felt within half an hour after delivery, and they ordinarily cease in thirty or forty hours, though they may continue longer. They are not generally accompanied by bearing-down efforts, nor by increased frequency of the pulse. During their presence the discharge from the uterus increases, and coagula are frequently expelled. From this latter circumstance they have been attributed to the presence of coagulated blood in the uterus, but, at most, this is only an occasional exciting cause. Their operation is, within certain limits, undoubtedly salutary; they prevent hemorrhage, diminish the size of the uterus, and expel its contents. The application of the child to the breast often brings on or aggravates the after-pains.

363. 5. *The lochia.*—The discharge of blood which accompanies delivery, continues for some time afterwards, doubtless from the mouths of the vessels exposed by the separation of the placenta; but after a while, the

* As a general rule, it is true that females do not suffer from after-pains subsequent to a first confinement. Exceptions do, however, occasionally occur. We have known primiparous women to experience as severe after-pains as those who had previously borne children. — EDITOR.

character of the discharge changes, and it can no longer be considered a mere escape of blood, but exhibits all the characters of a secretion. This state of the lining membrane of the uterus would lead us to expect such an occurrence. The discharge is called the "lochia;" or in popular language, "the cleansing." For three, four, or five days, it continues of a red colour, but much thinner, and more watery than blood, and not coagulable; it then sometimes becomes yellowish, like puriform matter; but more frequently maintaining its serous consistence, it changes its colour successively to greenish, yellowish, and lastly to that of soiled water.

It has a very peculiar odour, which can neither be mistaken nor forgotten, but which it is impossible to describe. The duration of the lochia varies a good deal: in some patients it ceases naturally and without bad effects, a few days after delivery, and I have repeatly observed this with those delivered of still-born or putrid infants. Generally speaking, in these countries it does not cease till about the end of three weeks, or a month; but much depends upon the constitution of the person. As to the quantity, it is impossible to fix any limits; it depends partly upon the extent of secreting surface, and partly upon the duration of the discharge. As the secretion is necessary for uterine health, the sudden interruption of it is generally attended with evil consequences.

364. 6. *The secretions and excretions.*—From the exertions of the second stage of labour, the secretion of the skin is increased, so that the surface is bathed in perspiration. After delivery, this active state of the secretion diminishes somewhat, but still continues above the ordinary standard; and very often the perspiration has a faint sickly odour. The skin is soft and flabby, with a slightly greasy feel.

As convalescence progresses, the surface returns to its natural state.

The kidneys may retain their usual activity, or, which is more frequent, have it somewhat increased after delivery, notwithstanding the unusual amount of perspiration; but this may be owing to the diet consisting principally of fluid matter.

The state of the bowels varies; sometimes it is unaltered; in others it is the reverse of what it was during gestation, patients who were constipated having now no need of medicine; and those who were annoyed by diarrhœa, having solid motions. The latter change is by no means uncommon, and may probably be owing to the increased secretion from the skin and kidneys.

7. *The milk.*—The enlargement of the breasts during gestation is generally accompanied with the secretion of a serous fluid, differing from true milk, though in some cases (seldom with first children) true milk is secreted during labour, and the woman can give suck immediately afterward.

In ordinary cases, however, the breasts remain quiescent for about twenty-four hours, but soon after that begin to enlarge, with stings of pain. At the end of the second or beginning of the third day, they are perceptibly larger, heavier, and more tense; the patient suffers from rigors, heat of skin, pain and soreness of the breasts, and the pulse is quickened. At this time the secretion commences; at first slowly and with difficulty; but afterwards more freely, and in proportion to the freedom is the diminution of the pain and fever, until after a few days it takes place without distress or disturbance. The milk at first differs from that secreted afterwards, and often acts as a purgative to the child.

365. Management of Women in Childbed.—I cannot do better than follow the order in which I have noted the phenomena of childbed.

In ordinary cases the *shock to the nervous system* does not require any active treatment. The patient should be kept in a state of perfect quiet, the room slightly darkened, and very few persons except the nurse admitted. Little talking should be allowed, and no whispering. Everything calculated to excite mental emotion should be avoided, and the patient be kept calm and cheerful. The horizontal posture should be strictly preserved, and the patient allowed to sleep, after which the nervous system will have recovered its tone, and the patient will be free from danger on this account.

366. As the state of the *pulse* is merely symptomatic, it will be remedied best by our successful management of the patient in other respects. It should be narrowly watched, and accurately estimated, as its deviations will often be the first evidence of mischief going on.

367. Immediately after the expulsion of the after-birth, a warm napkin should be applied *to the vulva*, and changed at short intervals during the day. This will afford relief from the smarting pain consequent upon the passage of the child. After some hours, when the patient is recovered, the external parts should be washed with tepid milk and water, containing a small portion of spirit. This must be repeated twice a day, not only for the sake of cleanliness, but to aid in restoring the parts to their natural state.

A horizontal posture is peculiarly favourable to the uterine system, in the relaxed state in which it is after delivery; the patient cannot assume an upright position, without a certain amount of displacement, and a risk of hemorrhage. By keeping the patient on her back, we may even remedy old displacements. A lady had prolapsus uteri after her second confinement, which lasted till she became again pregnant; this was mentioned to me when I was called to her in her third labour. I kept her unusually long in bed, and subsequently on a sofa, and the parts completely recovered their natural state, so that she suffered no more from the displacement. In ordinary cases, the *after-pains* require no treatment; but if they should deprive the patient of sleep, we may give an aromatic purgative or a dose of laudanum.

The only attention which the *lochia* require, is, that the napkins should be changed sufficiently often, and applied warm, as any sudden impression of cold to the external parts may be followed by the suppression of that discharge.

368. Directions should be given for the patient to void urine within six or eight hours after delivery or sooner; and this should be done as nearly in the horizontal posture as possible. Owing to the distensible state of the abdominal parietes, the patient will often wait much longer, if not reminded; and the consequences may be very troublesome, if not serious. The bladder may become paralysed, or inflammation may spread from it to the peritoneum. If there should be any difficulty in evacuating the bladder, as sometimes happens, a cloth wrung out in warm water, and applied to the vulva, will remove it; or if not, we must have recourse to catheterism.

369. The *state of the bowels* after delivery is of great importance; it is perhaps better that they should continue quiet for twelve or fourteen hours

after delivery, on account of the fatigue; but after that time has elapsed, we should procure a discharge by medicine, if there be none spontaneously. A dose of castor oil, senna, or rhubarb, may be given; and if necessary, repeated. The frequency of repetition must be regulated by the state of the bowels previous to labour. If we suspect any accumulation, we should not be satisfied until the intestines are well cleared out; and if the patient do not suckle her child, purgatives will be the more necessary, for the relief of the breasts. In the latter case, the saline purgatives will be found the more useful.

370. The state of the surface will point out the propriety of not exposing the patient to a draught of cold air. She should be allowed to cool gradually, and then the bed and bed-clothes so arranged as to afford a comfortable degree of warmth. The chamber should be kept cool and fresh. The smaller the fire (if there be one) the better.

371. When the breasts begin to enlarge and be painful, relief may often be obtained by friction with warm oil or fomentations, at the same time giving a dose of aperient medicine. But the best remedy is the application of the child; and the sooner this is done the better, as the secretion and escape of the milk will be facilitated, the feverishness diminished if not avoided, and a good nipple more easily formed than when the breasts are distended.

It is better to do this, even if it should not be the intention of the patient to suckle her infant, as it will afford relief; and by not suffering the child to do more, we insure the ultimate subsidence of the secretion, which is always in proportion to the demand upon it; if this be very slight, it will soon cease altogether.

372. The importance of presenting the horizontal posture has already been stated; I shall therefore merely add, that the patient should never leave her bed, even to have it made, before the sixth day; and if she can be persuaded to limit her exertions to this point for eight or nine days, so much the better. Far more mischief results from premature exertion, than from all the errors in diet added together.

373. The regulation of the diet is, nevertheless, of considerable importance, as excess, by inducing feverishness, may retard the convalescence. The patient should be confined to slops — gruel, panada, arrow-root, milk, whey, weak tea, &c. — with bread or toast and butter, or biscuit, for three or four days. When the excitement produced by the secretion of milk has subsided, if there be no counter-indication, she may take some broth, and on the seventh or eighth day some chicken, or a mutton chop, with some wine and water.

In all that concerns the diet, or the assumption of the upright position, or making exertion, it cannot be too strongly impressed upon all, that an excess of caution is an error on the safe side.

374. On certain Variations from ordinary Convalescence.—Although the following observations are a deviation from the plan I proposed, yet I should not feel justified in their omission, and I do not know that a better opportunity will offer for them than the present, as they may be usefully compared with the preceding description of ordinary convalescence. These deviations may depend upon the constitution or the character of the labour, or upon pressure exercised locally. Even without reference to the influence of the labour, there are certain irregularities

which occasion anxiety both to the patient and her physician. Some of these issue in serious disease; others, more numerous, are mere temporary deviations from the normal course, but requiring familiarity and tact to distinguish them from the more important attacks.

375. 1. *The nervous shock* may be very severe. In these cases the patient complains of great exhaustion; the senses are either unnaturally dull, or morbidly acute, the breathing is hurried, and panting, and the accordance between the respiration and circulation is broken. The aspect of the patient is that of a person in a state of collapse. The countenance is expressive of suffering, anxiety, and oppression. The pulse may be either very slow and laboured, or unusually rapid, very small, and fluttering. There are many cases, however, where the shock, though far from being so severe as in the case I have supposed, is quite sufficiently so to excite the fears of the medical attendant. Reaction is long before it occurs, or it may take place imperfectly or excessively, and the patient remain for some time in a very weak condition.

Under proper treatment, the patient will gradually recover from this state of exhaustion or collapse, unless the shock be excessive and then death will supervene in a few hours. I have seen several cases of this kind; in one case, the labour was tedious, but terminated naturally; two others were instrumental deliveries; but in none where a *post mortem* examination was obtained, was there either injury or disease discovered.

A due estimate of the nervous shock is of great importance in severe cases; for in almost every instance the progress of the convalescence is in inverse proportion to the amount of this disturbance.

The best remedy in these cases is opium, either in a large dose, or in small and repeated ones; it not only gives the patient a chance of sleep, the best restorative of all, but even if it fail in this, the system will be quieted, the respiration rendered more equable, the pulse slower and more natural, and the relation between these two systems restored.*

The exhibition of stimulants (wine or brandy and water) in moderate quantities is necessary; but we must be careful not to exceed, or they will do mischief instead of good. The amount of stimulants given in cases of collapse should have reference to the probable reaction, as well as to the present state of the patient. Ammonia or musk are the best medicinal stimulants, and they may be combined with the opium. The diet of the

* These remarks of the author are deserving of the serious attention of the young practitioner. "I have seen more than one instance," says Dr. Huston in a note to a former edition, "in which there was reason to believe the life of the patient was sacrificed from ignorance of the true character of the condition here referred to. If the attention of the practitioner be at the time particularly directed to puerperal fever, he is liable to confound the exhaustion in which he finds the patient, with the early stages of that disease. The cold extremities constitute the *chill*, while the haggard countenance, hurried respiration, and frequent pulse, are regarded as conclusive evidence of a rapid peritonitis. Bleeding from the arm or by leeches, is the instant resort, and a few short hours confirm the worst anticipations, by the fatal termination, a result which the efforts of the attendant have but too successfully aided in producing.

"The author speaks vaguely in recommending 'Opium, either in a large dose, or in small and repeated ones.' Where much pain and jactitation occur, the dose should be large, say a grain and a half, or two, or even three grains; but when the object is to soothe the nervous system, and sustain the circulation, smaller doses, as half a grain or ten or fifteen drops of laudanum, repeated every hour or two, with or without carbonate of ammonia, wine whey, or other mild stimulants, are appropriate remedies. When reaction ensues, of course these are to be laid aside.—EDITOR.

patient, when the effects of the shock have subsided, must be nutritious. It may be necessary to postpone the application of the child to the breast for some days, or even to give up suckling altogether in some cases.

All that has been said already upon the necessity of perfect quiet applies with ten-fold force to these cases of extreme nervous shock.

376. 2. *The state of the pulse.*—One variation from the usual alternations of the pulse has just been noted, in cases of great nervous shock, when it either sinks below its due proportion, or more frequently remains very quick, weak, and fluttering, during the period of collapse.

In almost all the cases of flooding after labour, when I have had an opportunity of examining the pulse up to the time of the occurrence, I have found it remain quick, and perhaps full, instead of sinking after delivery. This has been so marked in several cases, that I now never leave a patient so long as this peculiarity remains; and in more than one instance I believe the patient has owed her safety to this precaution. Three cases occurred within a very short time of each other, in which I noted this undue quickness of the pulse without any other untoward symptom; at that time there was no excessive discharge, and the uterus was well contracted. In all these, alarming hemorrhage occurred within an hour, and was with difficulty arrested. I have also remarked an undue frequency of pulse when the after-pains are extremely violent; and as the uterus is in such cases rather tender on pressure, it requires care to distinguish between this state and the commencement of puerperal fever. This observation will also apply to the quickening of the circulation, which takes place when lactation commences, and which in addition is accompanied by rigors. A careful examination, however, will generally lead us to a correct conclusion, and the subsequent diminution of the frequency of the pulse will remove all doubt. Again, the pulse is quickened when a large coagulum is contained in the uterus, or if the patient suffer from diarrhœa, or gastric disturbance. In some of these cases the diagnosis may be obscure, and it may be necessary to suit our treatment rather to the anticipated attack than to the present symptoms; thus, we may give small doses of blue pill or calomel in combination with opium, along with medicines suited to the peculiar symptoms present.

All the observations I have been able to make, confirm Dr. John Clarke's remark, that no patient can be considered safe whose pulse exceeds one hundred.

377. 3. *The state of the uterine system.* — Instead of a gradual decrease in the size of the womb, I have occasionally found on the fifth or sixth day that its bulk has increased, and that it has felt less firm than previously: this, combined with increased frequency of the pulse, has apparently threatened an attack of hysteritis; nor was this anticipation lessened, by the uncomfortable sensations of the patient, nor by the sudden decrease of the lochia. However, in most of these cases, I found upon applying hot fomentations to the abdomen, that more or less coagula were discharged, affording instant relief to the patient, and indicating the source of the symptoms. Purgative enemata also favour the expulsion of the clots; and in such cases may be given with great benefit.

It has been already mentioned that the uterus is not free from tenderness in cases where the after-pains are severe; and if it be rudely pressed, the outcry of the patient may lead us to suspect the presence of serious

disease. It will be observed, however, that this tenderness is *greatest during each uterine contraction, and that as these contractions subside, the soreness diminishes.*

Fomentations to the abdomen will generally mitigate this sensibility; but if the after-pains be severe, and the tenderness considerable, a full dose of laudanum, followed by an aromatic purgative, will probably relieve both.

The *vagina* may be attacked with inflammation, which sometimes proves extremely distressing; this will form the subject of a separate notice.

In cases where the lochia are acrid, the orifice of the vagina, with the labia and external parts, are apt to be excoriated. The patient may suffer extremely either from a smarting pain, or from itching; and it is difficult to say which is the more distressing. Extreme cleanliness, frequent bathing, lead lotions, black wash, or vaginal injections of warm water, may be tried, and will ordinarily afford relief; if not, the disease will generally subside with the cessation of the lochia.

378. 4. *The after-pains.* — Instead of the after-pains coming on about half an hour or an hour after the labour, in moderate degree, and ceasing after a short time, they occasionally commence immediately after the extrusion of the placenta with great severity, and long continuance. In these cases the tenderness of the uterus is marked, but when the pain is relieved by remedies, the tenderness disappears also. The pulse also is quickened for the time. This deviation does not depend upon the presence of coagula, as in the worst cases I have seen none were expelled, but it seems rather a spasmodic contraction of the uterine fibres. The best remedy is a full dose of opium, which should be repeated if necessary. At the same time hot flannels may be applied to the abdomen and vulva.

The after-pains sometimes continue at intervals, unusually long, and are very severe whenever the child is applied to the breast. They occasion distress and exhaustion by preventing sleep, and should therefore be relieved if possible, by cordials, aromatic purgatives, or a dose of opium.

379. 5. *The lochia.* — Variations in the quantity, quality, or odour of the lochia, not unnaturally excite great alarm in the mind of the patient, who regards any deviation in this secretion as a proof of serious disease. Yet very remarkable differences do occur, without any morbid affection of the uterus or vagina.

The discharge may cease a few hours after delivery, especially after the birth of still-born or putrid children, without any unpleasant symptoms.

The discharge may continue the usual time, but in very small quantity; and this is commonly the case when flooding occurs during or after delivery.

On the other hand, it may be excessive, though not prolonged beyond the usual time; or without being excessive, it may continue unusually long. In these cases it may be necessary to allow the patient a better diet, and to give tonics, such as bark, preparations of iron, &c.

In some cases the lochia, after decreasing in quantity for some time, are suddenly discharged in double quantity, and of a red colour, but without coagula. This generally happens when the patient is permitted to sit up too soon. Or it may happen at a later period, in consequence of

walking about too much. A little extra rest will, however, suffice to restore the patient to her former state.

Again, the os uteri is sometimes obstructed by a clot, and the lochia are greatly diminished, or perhaps altogether restrained, until the expulsion of the clot affords an exit to the accumulation.

Instead of the usual changes, from red to yellow, or greenish, the red discharge may persist; or after these changes have taken place, the red discharge may return. In these cases, it is necessary to be on our guard, as the change may be the precursor of secondary hemorrhage. The patient should be confined to the horizontal position, and clothed very lightly.

The lochia, after going through their ordinary changes, may terminate in uterine leucorrhœa, which may become permanent. This will be best remedied by counter-irritation to the sacrum, and the internal exhibition of copaiba, iron, or ergot of rye.

Again, the unusual colour of the lochia may excite alarm. Instead of the transition from red, to a pale red, yellowish, or greenish colour, they are sometimes a dark brown, and perhaps more tenacious than usual, or acrid, so as to excoriate the vulva.

Lastly, examples occasionally occur where the lochia have a very offensive fœtid odour, occasioning great annoyance both to the patient and her friends. The discharge is generally of a dark colour, and often acrid. It may arise from the decomposition of a small portion of the placenta or membranes which were left in the uterus or vagina, or from the putrefaction of coagula. In such cases the vagina should be syringed two or three times a day with warm milk and water, or a very weak solution of chloride of lime.

380. 6. *The bladder.*—"After severe labour," says Dr. Burns, "the neck of the bladder and urethra are sometimes extremely sensible, and the whole of the vulva is tender, and of a deep red colour. This is productive of very distressing strangury, which is occasionally accompanied with a considerable degree of fever. It is long in being removed, but yields at last to a course of gentle laxatives, opiates, and fomentations. Anodyne clysters are of service. An inability to void the urine requires the regular and speedy use of the catheter."

381. 7. *The breasts.*—Variations in the period at which the milk is secreted are common, but of no moment. If the vascular action be excessive, it must be moderated by antiphlogistic remedies, such as tartar emetic, purgatives, fomentations, &c., and by the frequent application of the infant.

If, as in some rare cases, no secretion should take place, the child will require a wet nurse, but the mother will not suffer.

When the nipples are deficient or mal-formed, we must endeavour to draw them out by the breast-pump; but if this do not succeed, we must obviate the ill effects of the secretion of milk, by tartar emetic, saline purgatives, fomentations, &c.

CHAPTER V.

PARTURITION.—CLASS II. UNNATURAL OR ABNORMAL LABOUR. ORDER 1. TEDIOUS LABOUR.

382. Definition.—The head of the child presents, and the labour is terminated without manual or instrumental assistance, but it is prolonged beyond twenty-four hours, from causes which occasion delay *in the first stage*. The placenta is expelled naturally.

383. Very slight experience is sufficient to show that delay in labour may occur in either the first or second stage, and a more extended observation will prove, 1, that when the delay is excessive, the *relative* duration of the two stages is destroyed, so that they bear no steady proportion to each other; thus, for instance, in a labour of sixty hours, the first stage may occupy fifty-nine, and the second only one, or *vice versâ*: 2, that the effects of a prolonged labour upon the constitution of the patient, depends upon the stage in which the delay occurs: and 3, that delay in the first stage involves very little if any danger, no matter how tedious it may be, but that delay in the second stage, beyond a comparatively short time, is always of serious import. Although these deductions are not distinctly enunciated by writers on midwifery, yet they appear to be involved in their practical remarks, inasmuch as they distinguish the causes of delay in the first stage from those in the second, as being much less dangerous. The above conclusions, drawn from numerical estimates, and supported practically by high authority, are sufficient, I think, to justify our making the distinction between "tedious" and "powerless" labours to depend upon the stage at which the delay occurs.

384. Statistics.—Unfortunately our best statistical reports only give the entire length of the labour, without distinguishing the stages, so that the first table I shall give will merely show the frequency of those labours whose duration exceeds twenty-four hours.

Authors.	Total Number of Labours.	Above Twenty-four hours.
Dr. Jos. Clarke	10,387	134
Dr. Merriman	2,947	128
Edinburgh Lying-in-Hospital	2,452	48
Dr. Maunsell	839	46
Dr. Thomas Beatty	1,182	69
Dr. Lever	4,666	62
Dr. Churchill	1,285	166

Thus, in 23,758 cases of labour, we have 653 prolonged beyond twenty-four hours, or nearly 1 in 36.

I may add, that delay is most common among first cases.

385. The following table is intended to exhibit the relative duration of each stage in labours of twenty-four hours and upwards, in which the delay occurred in the first stage, and the results to the mother and child. The registers of the Western Lying-in-Hospital have furnished the data, and as the cases are therein entered under the inspection of Mr. Speedy and myself, I believe they may be depended upon.

Number of Cases.	Duration of Labour.	Length of first Stage.	Length of second Stage.	Results to Mother.	Results to Child.
	hours.	hours.	hours.		
5	24	23½	½	favourable.	favourable.
13	24	23	1	do.	12 do. 1 putrid.
2	24	22	2	do.	1 do. 1 still-born.
3	25	22 to 24	1 to 3	do.	do.
1	25	19	6	do.	do.
2	25	17	8	do.	do.
2	25	16	9	do.	1 do. 1 still-born.
1	26	25½	½	do.	do.
7	26	25	1	do.	6 do. 1 still-born.
2	26	23	3	do.	do.
3	27	26½	½	do.	do.
2	27	26	1	do.	do.
1	28	27½	½	do.	do.
3	28	27	1	do.	do.
2	28	26	2	do.	do.
1	28	25	3	do.	do.
1	28	22	6	do.	do.
1	29	28½	½	do.	do.
2	29	28	1	do.	do.
2	29	27	2	do.	do.
1	30	29½	½	do.	do.
2	30	29	1	do.	do.
1	30	28	2	do.	do.
1	30	26	4	do.	do.
1	30	23	7	do.	do.
1	30	19	11	do.	do.
2	31	30	1	do.	do.
2	31	29	2	do.	do.
1	31	27½	3½	do.	do.
1	31	27	4	do.	do.
1	32	31½	½	do.	do.
4	32	31	1	do.	do.
1	32	24	8	do.	unfavourable.
1	33	32½	½	do.	favourable.
1	33	32	1	do.	do.
1	33	31	2	do.	do.
1	34	33	1	do.	do.
1	34	30	4	do.	do.
1	34	29	5	do.	do.
1	35	34½	½	do.	do.
2	35	33	2	do.	do.
2	36	35½	½	do.	do.
1	36	35	1	do.	do.
1	36	33	3	do.	do.
1	36	31	5	do.	do.

Number of Cases.	Duration of Labour.	Length of first Stage.	Length of second Stage.	Results to Mother.	Results to Child.
	hours.	hours.	hours.		
1	37	36½	½	favourable.	favourable.
1	37	32	5	do.	do.
2	38	37	1	do.	do.
2	38	34	4	do.	do.
1	39	38½	½	do.	do.
1	39	35	4	do.	do.
2	40	39¾	¼	do.	1 do. 1 dead.
1	41	39	2	do.	dead.
1	41	33	8	do.	favourable.
1	42	41¾	¼	do.	do.
1	43	41	2	do.	do.
1	44	26	18	do.	do.
2	45	44	1	do.	do.
1	45	44½	½	do.	do.
1	46	36	10	do.	do.
1	47	43	4	do.	do.
1	48	47	1	do.	do.
1	48	44	4	do.	do.
1	48	34	14	do.	do.
1	49	48½	½	do.	do.
1	49	46	3	do.	do.
1	49	41	8	do.	dead.
1	50	49½	½	do.	favourable.
1	50	49	1	do.	do.
1	51	50	1	do.	do.
1	51	48	3	do.	do.
1	52	48	4	do.	do.
1	53	52¼	¾	do.	do.
1	53	52	1	do.	do.
1	53	46	7	do.	do.
1	54	53½	½	do.	do.
1	54	53	1	do.	do.
1	54	33	21	do.	do.
1	55	54½	½	do.	do.
1	57	56½	½	do.	do.
1	57	56	1	do.	do.
2	57	53	4	do.	do.
1	58	57	1	do.	do.
1	59	57	2	do.	dead.
1	59	55	4	do.	favourable.
1	60	59½	½	do.	do.
1	66	62	4	do.	do.
1	69	63	6	do.	do.
1	74	72	2	do.	do.
1	74	73¾	¼	do.	do.
1	76	71	5	do.	do.
1	78	72	6	do.	do.
1	96	66	30	do.	dead.
1	100	84	16	do.	favourable.
1	103	74	29	do.	do.
1	177	176	1	do.	do.

386. Some apology may be due for the length of this table, and I trust it will be found in the fact that, at least as far as I know, it is the only

one of the kind on record. The reader will understand that from this list I have excluded all presentations but the head, all operative cases, all cases which were prolonged in the second stage, and all such as were of doubtful accuracy, but that beyond this I have in no degree selected the cases. The entire number amounts to one hundred and forty-three. Of these not one of the mothers died, although in some cases the first stage was enormously prolonged, and but ten of the children, one of which was putrid. If the relative length of the stages be examined, it will be found that it did not follow, because the first was very long that the second should be long also; and in many cases (not included in the table) when the second stage was delayed, the first was extremely short. Thus I think that, so far as it goes, this table proves the propositions with which I started; viz. that "when the delay is excessive, the relative duration of the two stages is destroyed, so that they bear no steady proportion to each other," and that "delay in the first stage involves very little if any danger, no matter how tedious it may be."

The only apparent exception to this rule, of which I am aware, are those cases in which some mechanical impediment exists, and which belong to an order to be hereafter considered. In these cases mischief arises, not from the prolonged first stage so much as from the impediment to the completion of the second. Undoubtedly a prolonged first stage is a bad preparation for undue prolongation or for any accidental complication of the second.

These conclusions I think are fairly deducible from the premises, but there are others which I would guard against, and these are, first, that because no evil happened in these cases, therefore nothing is to be done in any case where the delay is in the first stage, and secondly, that the delay was the result of bad management, whereas in most cases the patients were not brought under our care until the greater part of the time had elapsed. I do think that when we find no evil resulting from the delay, we are not warranted in active interference; but I am equally convinced that when we can remove the cause of it, we are bound to do so.

I may add, in confirmation of my own conclusions, the statement of Denman, "that neither mother nor child is ever in any danger (except in hemorrhage or convulsions) on account of the labour, before the membranes are broken," *i. e.* in the first stage.

387. Symptoms.—I conclude, then, that these cases of labours prolonged in the first stage, present nothing formidable as regards the mother, and very little as regards the child; but yet we find that the continued suffering produces a great degree of fatigue, and in nervous women especially, the loss of sleep is very much felt; the spirits are depressed, and the patient expresses a great dread of the result. Not withstanding this, however, the condition of the patient is favourable. The skin is cool, the pulse quiet, the tongue clean and moist; there is rarely any headach; the stomach may be more or less disturbed, but the other bodily functions are performed in a healthy manner. The pains recur regularly, though their extent is often limited, and their power inefficient, their duration and frequency varying occasionally. Still, a perceptible though slow progress is made.

The strength is seldom impaired, and the patient often gets some quiet sleep, which tranquillises the mind, and restores the bodily powers; there

is neither fever nor inflammation, the vagina is cool and moist, and both urine and fæces are evacuated easily and spontaneously.

The tranquil pulse, cool skin, and loud outcry, are all indicative of the first stage of labour, and on examination the head is found not to have passed through the os uteri, whether or not the membranes be broken.

The nervous shock is never in proportion to the length of the first stage of labour, but of the second.

388. Causes and Treatment.—The causes which occasion delay in the first stage of labour are various, and not always peculiar or confined to it, and the treatment must be adapted to each. No doubt can be entertained of the propriety of removing them, when this can be done, even though the delay they occasion may be innoxious. Let us examine the principal causes and their treatment separately.

389. 1. *Inefficient action of the uterus* is a very common cause of delay, and occurs most commonly in delicate women confined for the first time.* It may arise from constitutional weakness, a deranged state of the digestive organs, mental depression, uterine plethora, or irritation of the os and cervix uteri, &c.

We find the pains feeble, of short duration, limited in extent, often seated in front, and producing little effect upon the bag of membranes or cervix uteri. When the intestinal canal is deranged, they are mixed up with griping pains in the abdomen, which, in many cases, modify or supersede the real pains

It should also be stated that bodily weakness or even the presence of fatal disease does not always involve feeble uterine effort; patients in the last stage of consumption are often delivered with great facility.

390. *Treatment.*—The first element in the management of these cases is time. We must exercise patience ourselves, and encourage our patient to do so. All that is calculated to cheer her should be communicated, and she should be occupied, if possible, and amused. If it be day-time, she should not lie down, but may rest on a sofa, and walk about occasionally, taking the pains sitting or standing. The bowels must be freed by medicine, if necessary, and for this purpose enemata of a stimulating character may be used, as they very often also quicken the uterine action. The diet should be bland and nourishing, but not stimulating.

These palliative measures will be sufficient in many cases, in others they are of no use, and the patient may be exhausted from the prolonged suffering and want of sleep; and the best thing we can then do (if there be no counter-indication) is to give a full dose of opium, so as to suspend the pains for a time and procure sleep. If it succeed, the patient will wake up refreshed and strengthened, and the pains most probably return with increased strength. A purgative enema, administered when the patient awakes, is often of great service.

When the inefficiency of the pains depends on intestinal disturbance, it will be right to evacuate the bowels freely before the opiate is given, if one be necessary. Should there be indigestible matter in the stomach, it is probable that it will be evacuated spontaneously.

* It not unfrequently occurs in women who are not particularly delicate but the reverse, and who apparently labour under no constitutional weakness; the inefficient uterine action resulting apparently, in these cases, from some constitutional peculiarity—often descending from mother to daughter. On the other hand, the females of some families are remarkable for the ease with which they give birth to their children, independently of any physical peculiarity discoverable on the closest scrutiny. — Editor.

In case of plethora of the uterus or irritation of the cervix, we shall often derive benefit from the abstraction of blood, after which the pains generally become stronger; if they do not, we may have recourse to the opium for temporary relief.

391. So far the remedies mentioned tend merely to the removal of obstructions to uterine action; but as it does not follow that in all cases this relief is followed by vigorous action, we have next to seek for some agents which shall act directly upon the uterus. The one upon which most reliance is placed is the *ergot of rye*. This vegetable substance appears to have been known for a long period in Germany under the name of Rockenmutter, Mutterkorn, &c., and to have entered into the composition of various nostrums for hastening labour. It is mentioned by Camerarius in the "Actes des Curieux de la Nature" for 1668; and in 1777, Desgranges published his first researches upon it, in the "Gazette de Santé." Its introduction into British practice was, I believe, owing to Drs. Stearn and Chapman, of New York, whose favourable experience of its effects has been tested by many practitioners, and apparently with different results.* Desormeaux, Lachapelle, Beclard, Capuron, Jackson, Hall, &c., deny that it has any effect at all; on the other hand, we have the authority of Bordot, Chevreuil, Gendrin, Bigeschi, Luroth, Davies, Blundell, Jewel, Smith, and many others, in stating that it is effective and beneficial. From repeated trials, I can bear witness to its efficacy, though it is somewhat irregularly exerted; but I must add that I have seen it do mischief.

The substance itself, according to Decandolle, "is a peculiar species of fungus which attacks the ovary of grasses, and protrudes from them in a lengthened form, especially from rye;" hence the popular term "spurred rye."†

It is an oblong, slightly curved grain, about as thick and twice as long as a grain of wheat, of a dark brown colour externally, but lighter, and with a shade of pink internally. It has been analysed by Wiggins, Vauquelin, and Wright. The latter chemist states its component parts as follows:

A thick white oil	31·00 grains.
Ozmazome	5·50 "
Mucilage	9·00 "
Gluten	7·00 "
Fungin	11·40 "
Colouring matter	3·50 "
Fecula	26·00 "
Salts	3·10 "
Loss	3·50 "
	100· "

* The attention of the profession was first called to this article by Dr. Stearns of the State of New York, in a letter addressed to Dr. Ackerly, in the year 1807; and in the year 1813, attention was further directed to it by Dr. Prescott, in a letter which he read before the Massachusetts Medical Society. Subsequently the high authority of Dr. Dewees has served to bring it extensively into practice — too much so it is to be feared for the credit of the profession and the interests of humanity. — Editor.

† "Recently, Mr. Smith (Transactions of the Linnean Society of London, xviii., Pt. 3, p. 449, London, 1840), and Mr. Quekett, (London Lancet, June 22, 1839,) have maintained that the ergot is not a fungus, but a diseased state of the grain occasioned by the growth of a fungus not previously detected: to this fungus Mr. Quekett gives the name *Ergotætia abortans*. By the microscope, they discovered sporules, sporidia, or jointed bodies, which appeared to be the reproductive particles of the fungus."— *Dunglison's New Remedies*, 3d edition, p. 431. — Editor.

The chemical analysis of ergot has thrown but little light upon its active principle as yet, for none of its component principles produce the same effect as the substance administered entire.

It may be exhibited in various ways; that which I have found most certain, is to mix the bruised or powdered grain with a little water or milk, and simmer it for a few minutes over the fire, then give the grounds along with the fluid. Both vinous and acetous tinctures have been prepared, but I have not found them as effectual as the powder. Mr. Battley has also a "liquor secalis cornuti" (so it is called, if I remember rightly) which seems more certain than the tinctures; and I have also tried an extract which succeeded very well.

From fifteen grains to a scruple of the powder, half a drachm to a drachm of the tincture, and from five to ten grains of the extract, may be given every twenty minutes, until the effect be produced, or until we are satisfied that it will not act. I would not give more than a drachm, or at the utmost a drachm and a half of the powder (or its equivalent in tincture or extract); for if that do no good, more will be useless, and may be injurious.

If it succeed, we find in five or ten minutes after its exhibition, that the pains are stronger, longer, and more frequent; their increased frequency, indeed, is often remarkable, even when their force is but little augmented. I have noticed, that shortly after an effective dose has been taken, the pulse becomes slower until after the pain is over, but that ultimately it remains quicker.

Besides this power of strengthening feeble pains, the researches of Dr. F. Ramsbotham and others have proved it capable of *originating* uterine action.

392. So far we have spoken of its beneficial effects; and although in by far the majority of cases no injury is produced by it, yet in five or six cases I have witnessed cerebral disturbance in different degrees, from a severe headach up to delirium, coma, and insensibility, follow its use.

By others it is said to disorder the stomach, and if given in large doses, to cause gangrene; but such cases must be very rare. I think I have seen retention of the placenta from irregular uterine contraction after the birth of the child, fairly attributable to it.

By Girardin, Burns, Moreau, and others, the child is stated to be more frequently still-born after the use of ergot, either from some poisonous influence indirectly exerted upon it, or by the greater pressure of the uterus upon the cord. I have seen some cases confirmatory of this statement, and of the latter mode of explanation, as the uterine action was almost incessant.

Dr. Beatty has published a very interesting paper showing that in certain cases the ergot does exert a poisonous effect upon the fœtus, and he concludes that the child is not safe unless the labour be concluded within two hours from the administration of the ergot. More recent observations seem to confirm this view.

393. I think from what has been said, that we may conclude that the ergot of rye may be tried, 1, when the pains are feeble and inefficient, without especial cause; 2, if the os uteri be soft and dilatable; 3, if there be no obstacle to a natural delivery; 4, if the head or breech present, and

be sufficiently advanced; and 5, if there be no threatening head symptoms, nor excessive general irritability.

But on the other hand it should not be given: 1, if the os uteri be hard and rigid; 2, if the presentation be beyond reach; 3, if there be a malpresentation; 4, if the pelvis be deformed; 5, if there be any serious obstacle to delivery in the soft parts; and, 6, if there be head symptoms, or much general irritation.

Though in some cases, when timely administered, it may anticipate the use of the forceps at a later period, it is not likely, as some have supposed, ever to supersede the use of that instrument, and it is not suited to those cases in which the crochet is required.*

394. Borax is said by German writers to have the power of quickening uterine action, though it is seldom used in this country. Dr. Rigby says, "We have combined these two medicines (ergot and borax) with the best effects, and generally give them in the following manner: ℞ Secalis Cornuti ℈i—ii; Sodæ subborat. gr. x; Aq. Cinnamomi ℥ifs. M. fiat haustus. Cinnamon, which is a remedy of considerable antiquity, has also a similar action upon the uterus, although to a less degree."

Dr. Radford of Manchester, has lately proposed the application of galvanism in tedious labour from want of power in the uterus in accidental

* Of the power of ergot to excite uterine contractions there can be no doubt; that it occasionally fails to do so under circumstances apparently favourable for its action, will be admitted by all who have had much experience with it. Why it fails, we know not; but that it very generally acts with decided energy, particularly during parturient action, is perhaps as well established now as is the action of almost any other article of the Materia Medica. In this country, its *too* extensive employment has left no doubt on this point. The only questions which remain to be settled are as to the circumstances under which it is proper to be used, the dose, and mode of administration. The experience of Dr. Huston, as he states in a note to a former edition, confirms the observations of Doctors Patterson and Ramsbotham as to its power of bringing on premature labour, and its fatal influence on the child when employed for that purpose, although he "cannot admit that this occurs in consequence of the child being poisoned by the ergot through the system of the mother."

The *incessant* action of the uterus, under the influence of ergot, is very unlike the *intermittent* contractions which occur in natural labour. This state of permanent contraction of the organ either detaches the placenta, or so compresses it as to destroy its functions before the child is in a situation to respire. The appearance of the children born under these circumstances confirms this view.

The intelligent practitioners of this city use the ergot chiefly during or subsequent to labour to overcome uterine inertia, and they always avoid its administration where any obstruction or great disproportion between the size of the child and the passages of the mother exists. It is a rule with them also to abstain from its employment until the os uteri is not only *dilatable*, but *fully dilated*, and the other soft parts in a favourable state of relaxation. Even when thus cautiously had recourse to, the child will not unfrequently be dead-born.

The *dose* given is from one to two scruples of the powder, or an amount of the article equal to that, whatever may be the preparation employed. Some prefer smaller doses, as ten or fifteen grains, repeated every fifteen or twenty minutes until the desired effect is produced.

Some practitioners always administer the powder in the form of electuary, or diffused in water. The best mode of giving the ergot is, perhaps, *recently* powdered, in *hot* water, in doses of a scruple every twenty minutes, until a drachm is taken, unless the proper effect occurs sooner: more than that quantity is never required, if the article be good, and the case one adapted to its use.

Experience has shown that ergot, especially when powdered, rapidly deteriorates; — to avoid this and at the same time furnish an article in a convenient form for immediate use, the Pharmacopœia of the U. S. prescribes a *wine* made by macerating two ounces of the ergot (bruised) in a pint of wine, of which one or two drachms are given at a time, and repeated if necessary.

The oil, tincture, and extract, are rarely used. — Editor.

hemorrhage, irregular contraction, and to bring on premature labour, and he relates a case of hemorrhage in which he employed it successfully.

Professor Simpson tried it in eight cases of protracted labour, and thus sums up the results:—"In one instance, the pains were more frequent in their recurrence, but shorter in their duration, during the application of galvanism. In five other cases, the employment of the galvanism neither increased the average frequency of the pains nor their average duration. In one, the pains ceased while the galvanism was applied, and returned upon its removal. In another the uterine action ceased while the galvanism was applied, and did not return for twenty-fours afterwards." So far the inference is unfavourable, but the cases are too few to found any positive conclusions upon them.

I have already alluded to the beneficial effects of stimulating purgative enemata; and I may add that some writers have recommended stimulants externally, such as mustard poultices or friction with stimulating liniment. I have never found them of any use.

395. 2. *Undilatable os uteri.*— With the first child the cervix uteri is more unyielding than subsequently, and also in women of advanced age. It may give way, however, within a reasonable time; but in some cases it does not, and on examination we find the lips thin, hard, and rigid, or soft, semi-pulpy, or œdematous, and that little progress in dilatation is made during each pain. The pains themselves may be frequent, and very severe, notwithstanding the slight effects they appear to produce. The thick pulpy or œdematous cervix uteri is carefully to be distinguished from the soft and flabby condition, which is a kind of transition state in the ordinary process of dilatation, and into which the thin and rigid cervix must pass before it will dilate. The pulpy œdematous cervix is as undilatable as the thin and hard. The latter is more frequent in primipara; the former occurs indifferently, and appears to be the result of irritation, caused in some cases, doubtless, by too frequent examination.

Besides these two varieties of undilatable os uteri, a similar state may be produced by cicatrices and the consequences of previous injury.

396. *Treatment.* — If the case were left alone, in the majority of instances I have no doubt that the action of the uterus would overcome the obstacle, at the expense, of course, of considerable fatigue, and when the pelvis is large enough to admit the head covered by the cervix, of some risk from pressure: but in a few cases, the os uteri resists all the force brought against it, and circular laceration of the cervix takes place. Dr. Merriman records such a case occurring in the practice of Mr. Scott of Norwich, and two others have been published by Dr. Evory Kennedy, and one by Mr. Power of this city. Within a few weeks I have seen a similar one, and Mr. Lever, Dr. Davis and Dr. Reardon have since recorded each another. In my case the pelvis was large, and the head, covered by the cervix, descended into its cavity; and I believe the laceration was as much owing to the pressure of the cervix between the head of the child and the brim of the pelvis, as to the expulsive force.

Although these cases be rare, yet as we possess the means of relieving the condition of the os uteri, it is our duty in all well-marked cases to avoid the risk, taking care, however, not to confound the early and normal condition of the parts with the state we are describing.

The most effectual remedy is the loss of blood, nor need we fear that

this will produce an unfavourable effect upon the patient. Dr. Dewees recommends it even with delicate women; in one case he took away two quarts of blood, and the patient did well. Dr. Davis has taken between 30 and 40 ounces; but it will not in general be necessary to abstract so much. Neither ought we in any case to bleed in anticipation of the difficulty, as has been advised.

In most cases of rigidity, fourteen or sixteen ounces rapidly taken from an ample orifice in the arm will be sufficient, and if it make the patient feel faint, so much the better; after which, if she be much fatigued, rest may be procured by means of an opiate; and this will generally be succeeded by a softened, yielding condition of the parts.

397. Should the venæsection only partially succeed, however, or in case it be not desirable to have recourse to it, we may then try the tartar emetic, which I believe was first used in these cases by Dr. Evory Kennedy of this city. It is an exceedingly valuable remedy, perfectly safe, and very successful. It should be given in small doses so as to excite and keep up a state of nausea, and it may be advantageously combined with a purgative,—take for instance the following formula: ℞. Magnes. Sulph. ℥i; Infus. Sennæ ℥viiſs; Antim. Tart. gr. iii; Syr. Zinzib. ℥ſs. M. capiat cochlearia duo omni semihorâ, vel omni horâ.

Emetics were recommended by Lowder, and by many others since his time, founded on the observation, that the spontaneous vomiting in labour is almost always followed by relaxation of the os uteri; but as the same benefit results from exciting nausea, it is much better to avoid the shock of vomiting. Opium has been used to suspend uterine action; but it is far more effective when given after bleeding. Tobacco enemata have been proposed and tried; but their effects are so uncertain and occasionally so formidable, that their use is hazardous, and to be deprecated. Dr. Dewees says that they do not succeed in softening the cervix.

Belladonna was recommended by Chaussier, from its effects in relaxing sphincters; but there are very serious objections against its use. Dr. Rigby states, "for our own part, we must confess, that although we have seen this application tried repeatedly, it has never produced the desired effects; but has invariably brought on very troublesome and distressing symptoms, such as sickness, faintness, headach, vertigo, &c."

French practitioners are in the habit of using mucilaginous injections, after the recommendation of Gardien, nor is there any objection to them, although I cannot say I have seen much good from them. The hip-bath was tried by Dr. Dewees, but without adequate benefit; it weakens the patient, and may possibly give rise to hemorrhage.*

* "In practice," remarks Dr. Lever, (*Lond. Med. Gaz. Nov.* 1849,) "we find women, who have suffered in early or unmarried life from one of the forms of dysmenorrhœa, when pregnant and in labour, with the os uteri thin, sharp, knife-like, so that its edge is scarcely to be felt — in fact, is often overlooked by the unpractised finger. The sufferings of the patient are intense; the dilating stage of labour is protracted; and, if untreated or unrelieved, by the time the os uteri is dilated nature is exhausted, uterine effort fails, and such a case is frequently terminated either by the forceps or by craniotomy. In most cases, these evils may be averted by the timely employment of opium, and the best mode of securing its good office is in the form of enema.

"We occasionally find the first stages of labour rendered tedious by a hardened, undilatable condition of the os uteri, in women who have suffered from chronic inflammation of the neck of the uterus, or those who have worn mechanical contrivances for the purpose of supporting the viscus, and in those who, from disease, imaginary or real, have been submitted to the influence of some escharotic, at the present day by far too

398. I believe we shall rarely, if ever, fail in softening the cervix by some one of the remedies I have recommended, and I must beg leave to enter my protest against more active interference, except in such extreme cases as that related by Mr. Lever, in which the rigidity of the os uteri is insuperable notwithstanding an ample trial of strong pains and the usual remedies; in such cases incision of the cervix may be necessary and successful, as in Mr. L—'s case. Dr. Smellie advised gentle dilatation of the os uteri as well as of the vagina, and he has been followed more recently by Doctors Hamilton and Burns, but opposed by the highest English authorities, and by all without exception, I believe, in this country. I do not deny that dilatation may thus be effected; but I believe it to be hazardous in skilful hands, positively dangerous in unpractised ones, and unnecessary in all cases.

399. *Excess of Liquor Amnii.* — It occasionally happens that the secretion of liquor amnii is in excess, most probably in consequence of some inflammatory state of the amnion: at least the researches of M. Mercier and others seem to favour this opinion. In other cases, a considerable quantity of fluid is found between the amnion and chorion, thus adding to the bulk of the contents of the uterus. This state of over-distension involves no danger to the mother, though it certainly impairs the force of the uterus, and so prolongs the first stage. I may add that the child is often still-born or diseased.

400. *Treatment.* — We must be cautious in assuming this to be the cause of delay, and temporise until experience has proved that the uterine action is deficient. If necessary, rest may be procured by opium, and if, after that, there is no improvement, and the uterus be unusually large, the membranes may be ruptured; after which the pains become stronger and more frequent. Before we do this, however, we must be sure that the os uteri is dilatable, and the presentation natural.

401. 4. *Toughness of the membranes.*—Generally speaking, the membranes yield to the pressure from above about the time when the os uteri is fully dilated; but this is not always the case. They sometimes remain entire until protruded through the external orifice, but in these cases without causing delay; in other cases their adhesion to the uterus is more firm, and they neither break nor protrude, but of course occasion a pro-

commonly practised. This condition of the os uteri needs no description; the sufferings of the patient are excessive and protracted, and, if unrelieved, may be followed by results serious to mother, and fatal to child. In addition to blood-letting, applicable to some cases, to the warm bath, of immense value, to the exhibition of antimony and this is of the greatest service, we find, when the latter has been exhibited, and has produced its desired results, relaxation of the os uteri, and increase of discharge, that opium, given in a full dose, will render these permanent, and thus prove a most valuable agent in completing a safe delivery.

"Opium has been recommended most strongly in cases where the os uteri is callous: but if the callosity depends upon previous injury, or is the result of disease, its value, in my opinion, depends upon its power to curb uterine action until vaginal interference removes the obstruction to the passage of the fœtus. But there is another condition of the os uteri in which opium acts, and like a charm: — in women who have suffered from irritable uterus, where the vagina is generally dry and hot, although not oversensitive; but the moment the examining finger touches the os uteri, the patient shrieks out, shrinks from the attendant, and by her cries and motions evinces the sufferings she endures. In addition to subsidiary measures, as the warm bath, the injection of linseed tea into the vagina, great benefit is to be derived from the use of opium, either by the mouth or by the rectum; the latter mode of employment being the one I prefer."— EDITOR.

longed first stage, because the liquor amnii which is retained, prevents the more forcible contractions of the uterus.

402. *Treatment.*—The delay should never, on slight grounds, be attributed to this cause, and not unless the pains are active, and the os uteri perfectly dilatable: when no doubt remains, the remedy is obvious, viz. to rupture the membranes.

403. 5. *Premature escape of the Liquor Amnii.*—This may occur from weakness of the membranes, from violence, accidents, or careless examinations, and as the early dilatation of the os uteri is effected mechanically by the "bag of the waters" acting as a wedge, its absence will delay the operation by making the head of the child the dilating power, for which it is by no means so well suited.

404. *Treatment.*—If the pains be active, and the os uteri not rigid, all that is necessary is a little patience, as it is merely a question of time, involving, it is true, longer suffering to the mother, but no danger to her or her child. In all such cases, an early examination should be made, in order that no time may be lost, if the presentation be abnormal.

If the os uteri be undilatable, and with first children it is not unusual under the circumstances, the remedies already recommended (§ 395–6) for such a state of the parts must be employed.*

405. 6. *Obliquity of the uterus.*—The uterus may acquire an inclination one way or the other during pregnancy, from different causes, so as to affect the progress of the first stage, by destroying the unity of axis of the uterine cavity and pelvic brim, so that the head of the child is not applied in a right direction to the brim.

Thus the position in which the patient lies during pregnancy, may give the uterus an inclination to the right or left, and the relaxation of the abdominal parietes may cause "pendulous belly." I have no doubt that obliquity may cause delay; but it is far less frequently the case than was supposed by Deventer, who first pointed it out to his disciples. Dr. Denman, who objects to Deventer's opinion, remarks, nevertheless, that "it must, however, be allowed, that some labours are procrastinated by the mere oblique position of the os uteri." Dr. Wm. Hunter very truly remarks, "As far as I have been able to observe, the mere obliquity of the uterus never occasions so difficult a labour, as to require any artificial arrangement to bring the os uteri into a proper situation. In such cases, as in many others, art can do little good, and patience will never fail."

The mal-position of the os uteri will be detected on making an examination: it will be found at one extreme of the transverse diameter of the brim, or close to the sacrum; and when our attention is thus excited, an examination of the uterine tumour will decide upon the existence of the obliquity. The mere deviation of the os uteri from its ordinary situation is not sufficient, because that will soon be altered by the pressure of the

* As Dr. Lever very correctly remarks (*op. citat.*), the too early escape of the liquor amnii, in addition to depriving us of the efficiency of the bag of water to prepare the way for the passage of the child, causes the latter to be brought into close contact with the walls of the uterus, which is therefore abnormally stimulated, while the head is brought into direct contact with the os internum, the most sensitive part of the uterus; not only is the labour, in consequence, rendered more tedious, but also more painful, while the birth of a living child is rendered more doubtful. Here the well-timed, cautious, and judicious exhibition of opium controls excessive uterine action, alleviates pain, and gives a better security for the welfare of the child.—Editor.

pains, if the axis of the uterine cavity be in accordance with that of the brim.

406. *Treatment.*—Although I do believe that the completion of the first stage may be delayed by lateral inclination of the uterus, I cannot but agree with Dr. Hunter that little is necessary except patience; the uterine contractions tend, as we have seen, to bring the axes into accordance, and this may be aided by placing the patient on the side opposite to the inclination. I do not think that interference with the os uteri is ever justifiable.

Few practitioners, I fancy, will doubt that in an aggravated case of anterior obliquity, or "pendulous belly," the deviation from the proper direction must be a serious difficulty, and one that patience alone is not likely to remedy. In these cases it is customary and very useful to place the patient on her back, at least till towards the end of labour; but in some cases this alone is not sufficient. "We have found," says Dr. Dewees, "more than once, in cases of extreme anterior obliquity, that it is not sufficient for the restoration of the fundus that the woman be placed simply on her back: but we are obliged to lift up and support by a properly adjusted towel or napkin, the pendulous belly, until the head shall occupy the inferior strait." I believe that this will be sufficient in all cases; but a very high authority, M. Baudelocque, practised further manipulation; in a case of the kind he attended, after placing the patient on her back, he says, "I raised the abdomen with one hand to diminish the obliquity of the uterus; while with two fingers of the other, after having pushed back the child's head very little, I was able to hook the anterior edge of the orifice of the uterus, to bring it towards the centre of the pelvis, where I kept it during a few pains; and then permitting the woman to bear down with the little strength she had left, she was delivered in the space of a quarter of an hour."

407. There is a certain condition of the os uteri, the result probably of some obliquity, although it is not externally perceptible, which causes considerable delay in the first stage. I allude to those cases where, in the progress of the dilatation of the os uteri, its anterior lip is caught between the head and the symphysis pubis and its retraction prevented. It may also result from the unequal dilatation of the anterior and posterior halves of the cervix, as in some cases, I have found on examination during a pain, that although the posterior lip was dilated and retracted, the anterior was drawn still more tightly over the crown of the head. However produced, the effect is a delay of some hours in the first stage. Dr. Hamilton was the first, I believe, to call the attention of the profession to this peculiarity.

408. The remedy is simple: during an interval between the pains the os uteri is soft and dilatable, and it is very easy with one finger to push the anterior lip over the crown of the head; and having done this with great gentleness, it should be maintained there by steady pressure during the next two or three pains. It will soon be felt retracting whilst contracting, and then it will slip over the head altogether. After this difficulty is removed, the labour will proceed more rapidly to its termination.

When the head fills the pelvis very tightly, it is not easy, nor in some cases possible to raise the anterior lip, on account of the want of space; and as no force should be used, we are compelled in such cases to trust to the gradual predominance of the expulsive force over the resistance.

And when the lip of the os uteri becomes œdematous from the pressure, or inflamed, as is not very uncommon, it will require great gentleness; in fact, if not easily raised, it had better be let alone.

409. The causes already enumerated may be considered natural ones, which, in general, can neither be foreseen nor prevented; but we are not to forget that delay in the first stage is frequently the result of mismanagement. Thus the use of cordials on the plea of supporting the strength, keeping the room hot and close, putting the patient to bed too soon, encouraging her to make efforts prematurely, injudicious attempts at assistance, omitting to evacuate urine, &c., will all act upon the labour, and retard its progress. A well-instructed nurse will avoid these mistakes; but we may be called in after the effect has been produced, and then a little common sense will be our best guide.*

410. These causes all act upon the first stage of labour, and although they offer a certain amount of obstruction, and make the labour other than a natural one, none are of such a kind as to prevent its being completed by the natural agents.

Again, we have seen that the delay is attended with no ill effects to the mother, and little if any to the child; that at most it occasions a degree of fatigue, weariness, and exhaustion (which is soon repaired); consequently, whilst this is a sufficient warrant for endeavouring to remove the cause, it does not justify our attempting to hasten the labour, merely because the first stage is tedious.

I would recommend to my readers a careful perusal of the controversy between Drs. Hamilton and Collins, as throwing much light on the management of the first stage. It will be found in the Dublin Journal and Medical Gazette for 1839.

* Labour is occasionally rendered tedious, during its first stage, by the occurrence of irregular and spasmodic pains. "They are recognised," says Dr. Lever (*op. cit.*), "by their acuteness, by the want of consentaneous action in the uterine fibres — some portion of the uterus, during their continuance, being hard and contracted, while the other portion is soft and yielding; there is also no distinct or regular interval of time between the paroxysms of pain. If untreated or unrelieved, the strength of the patient is exhausted before the establishment of true labour pain; or, the child, which at the commencement presented normally with the head, may even have its position changed to that of the shoulder, in consequence of the uterus contracting on one side only, and thus forcing its contents over to the uncontracting or yielding side. In such cases, the utility and value of opium are most marked. It may be exhibited by the mouth or per anum. It will calm the spasm, subdue irregular action, alleviate pain, procure sleep; and after this, true and regular uterine action will be established. Manifold are the instances of its value I have witnessed under such circumstances."— Editor.

CHAPTER VI.

PARTURITION.—CLASS II. UNNATURAL LABOUR. ORDER 2. POWERLESS LABOUR.

411. Definition.—The labour is prolonged in the second stage by causes which act on the uterine power primarily or secondarily, rendering the pains feeble and inefficient, or totally suppressing them. In consequence of the stage at which the delay takes place, certain symptoms arise which render speedy delivery imperative. The pelvis is sufficiently roomy.

412. We have just seen that delay in the first stage of labour is unattended with serious results to the mother, and very rarely to the child, and we remarked that although feeble, the pains recur regularly; that the labour advances, though slowly; that the strength is not seriously impaired, though temporary fatigue may be induced; that there is no fever or local inflammation; that the vagina is cool and moist; the evacuation of urine and fæces easy; that there is no abdominal tenderness; and lastly, that even if unaided, the labour will be completed by the natural powers.

413. Symptoms.—We have now to investigate the effects of delay in the second stage; and we shall find them very different. For a time the second stage may continue without any bad symptoms, even though unusually long, nor can we fix a definite time, after which they are developed; I have known them occur after eight hours, or not until twenty or twenty-five hours have elapsed; but in general, there are symptoms of constitutional suffering after the second stage has exceeded twelve or fourteen hours.

The pains, which had been regular and powerful, are observed after this period to become irregular, both as to recurrence and force; for a while they may be more rapid, and then return less frequently, and evidently with far less effect. They may continue to grow weaker until the characteristic bearing-down effort ceases altogether; and with equal suffering we have the loud outcry and slight force of the first, just as though the labour had retrograded. In some cases the character only of the pains is changed, and not their frequency; in others, they return at lengthened intervals.

414. Other symptoms accompany or shortly follow this break-down of the uterine action; the shivering which was mentioned as a symptom in natural labour, often becomes extremely severe, so as to resemble a slight convulsion; the vomiting becomes more frequent and distressing, and green or bilious matters are ejected; the patient is restless, throwing her arms about, and repeatedly changing her position; the skin is hot, whether moist or dry; the pulse rises, and continues from one hundred to one hundred and forty; the tongue is dry, loaded, and furred, with sordes about the teeth; the mind is disturbed, fearful, and despondent: the vagina is hot, and, as well as the os uteri, tender to the touch; the bland mucous discharge is changed to a yellow or brownish colour, and is some-

times, though rarely, acrid or fœtid; and the pressure of the child's head prohibits the evacuation of the bladder.

415. These symptoms succeed each other much in the order in which they are enumerated, if the patient be not relieved; of course they vary in degree, and in many cases some are absent; but sufficient will be present in every case when the second stage is excessively prolonged, to characterize the labour. Should the patient be so unfortunate as to obtain no assistance, the case goes on from bad to worse, all the symptoms are aggravated, and new and most formidable ones are added. The vomiting becomes more frequent, and the matters ejected are dark-coloured; the abdomen becomes tender, the jactitation and restlessness ungovernable, the pulse rapid and feeble, the skin covered with cold clammy sweat, the tongue brown and dry; the patient falls into a state of half-stupor, with low muttering delirium, and ultimately death closes the melancholy scene.

In all such cases the child is in great jeopardy, and unless the woman be timely relieved, it will be lost.

That these symptoms do really arise when the second stage of labour is protracted, from whatever cause, will not be questioned by those whose experience among the mismanaged poor has been extensive; and there can be no doubt that they would arise in similar cases among the higher ranks, were not the assistance of art enabled to anticipate them.

416. Causes. — I do not profess to be able to explain why this series of alarming or fatal symptoms should result from delay in the second, rather than in the first stage of labour; it may be that the first stage is a more local, the second a more constitutional process; that in the latter the different systems of the body (vascular, nervous, muscular, &c.) are deeply involved, and that a return to their natural state, without the removal of that which occasioned their implication, is impossible; or we may say, if we prefer, with the Arabian writers, that it arises "*ex lege naturæ*," that the process must be fulfilled, or the lives of mother and child be sacrificed. Whatever form of expression we use, the fact remains the same; the symptoms which arise from delayed second stage differ from those in the first, and the case may terminate fatally if unaided.

I have stated that these symptoms arise because of the delay in the second stage, and that they are the same, no matter what be the cause of the delay. It may be occasioned by some peculiar condition of the uterus itself, by obstruction in the soft parts, by deformity of the pelvis; but still we find the same series of symptoms. As the treatment differs according to the cause, I shall in this chapter refer only to those which affect the uterus itself, taking the phenomena which result as the general type.

417. *Inefficient or powerless condition of the uterus* in the second stage, as in the first, may be the result of various circumstances, such as weak constitution, mental emotion, disease, &c. Women of a *weak constitution*, especially in their first confinement, not unfrequently find the uterine powers fail, after some hours of endurance, and that without our being able to restore them. These are the cases, and these only, in which there is anything to fear from a prolonged first stage; for the exhaustion produced by it, and which in healthy women is of no consequence, may be the cause of inefficient uterine action in the second stage.

In women of an irritable nervous temperament, there is also occasionally a failure of uterine powers in the second stage.

Mental emotion, though it has less influence in the second stage than in the first, may nevertheless suspend the power of the uterus; and although in most cases it returns after an interval of freedom from pain, yet in others it does not, and bad symptoms set in.

Disease of the uterus, even when offering no physical impediment to delivery, may yet so interfere with the joint action of the muscular fibres, as to render the pains of little avail. Whilst this is confined to the first stage, it is of little import; but the uterus may complete that stage, and yet be seriously affected by the continuance of the same cause in the second; then the consequences are more serious. Thus rheumatism of the uterus, which so often stimulates the false pains and aggravates the suffering of the real ones, may at length interfere with the forcing pains, so much as to detract from their efficiency, or to render them almost nugatory.

Again, tumours in the uterus offer a mechanical impediment to the contraction of the organ, besides their interference with the conjoint action of the fibres, and in some very rare cases, they have been known to render the labour powerless.

Other uterine affections acting upon a certain condition of the constitution, may render the organ unfit or unable to complete the process of delivery, and the delay being in the second stage, the symptoms already described will be developed, though the time at which they appear varies very much.

I need not say that mismanagement will greatly aggravate this tendency in all cases; and in some, good and judicious care may possibly avert it.

418. Treatment.—The cause of the bad symptoms of powerless labour is, as we have said, the delay in the second stage, but the reason of our interference is not the delay, but the urgency of the symptoms, so that if the labour should be prolonged, and no ill consequence arise, we should not be justified in interfering further than to remove the cause.

Of course a case of powerless labour presenting the formidable array of symptoms I have described, will very rarely occur in the hands of a judicious practitioner, as he would previously decide upon the propriety of interfering; but we may be called to consult upon such cases. Our duty then, will be to examine the condition of the patient carefully and minutely; the pulse, tongue, head, abdomen, and, above all, the genital system, so as to appreciate correctly the present state of the patient; and not this only, but we must calculate as accurately as possible from the history of the symptoms, duration of the labour, &c. the rate at which the patient is running down. These investigations are for the purpose of solving three important questions.—1. Whether interference be necessary. 2. What mode of interference is preferable: and 3. The best time for interference.

419. 1. The *necessity for terminating the labour* is grounded almost solely upon the condition of the mother. If we find the pulse permanently quickened (say 100 or upwards), a degree of fever present, the head not advancing from the pains having lost their force, with more or less of the other symptoms I have described, we may be pretty certain, either that the natural efforts will not terminate the labour; or, supposing that possible, the condition of the patient will be so much deteriorated in the time required, as to render the delivery by the natural powers more

dangerous than the employment of art. In forming a conclusion upon this point, the estimate of the "rate of progress" of the labour will be of great value.

420. 2. The *time at which we ought to interfere* will depend chiefly upon the rapidity of the accession and increase of the unfavourable symptoms, and also upon the condition of the child. For example, if the patient be getting rapidly worse, and the bad symptoms increasing formidably, the only object will then be to determine upon the quickest mode of delivery: but, on the other hand, if her state be less threatening, demanding less promptitude, then we may take into consideration the condition of the child, and according as we believe it to be alive or dead, we may venture upon a short delay or deliver immediately.

I have already enumerated in detail (§ 261) the signs of the life or death of the child: the most important of which are, the results of auscultation, the movements of the child felt by the mother, and the elastic feel of the integuments of the head. The positive evidence of the first two, is quite conclusive; *i. e.* when the fœtal heart is heard or the movements felt, there can be no doubt that the child is alive; but their negative evidence is not so conclusive. We may conclude that the child has died during labour, if after having heard the pulsations of the fœtal heart distinctly, we have found them gradually become weaker, and at length permanently inaudible; if the movements, at first lively and distinct, have ceased; and if the tumour of the scalp has acquired a flabby emphysematous feel. The feeling of the cuticle is valuable, but rather as a proof of the child having been dead some time. Now what is the practical use to be made of a knowledge of the child's being living or dead? 1. If the child be dead, there need be no delay; the moment we are satisfied either that the natural powers will not be able to terminate the labour, or that the condition of the mother demands assistance, we may instantly interfere, and we are free to consider the mother's interests only as to the mode of doing so. 2. If the child be living, and the symptoms not very urgent, a short delay may be allowed, so as to give fair play to the natural powers; or if immediate relief be desirable, we should give the child a chance if possible, by employing means which do not necessarily involve its destruction. But I would repeat, that the saving of the mother's life being our first object, if the symptoms demand it, we must discard all consideration of the child, even if it be alive; although this must not be done without serious deliberation.

421. 3. The *modes of delivery* at our command are, 1, the vectis; 2, the forceps; 3, the crotchet. We may lay it down as an axiom that that method of delivery is best, by which labour can be terminated most easily, and with the greatest safety to the mother and child. If there be space enough between the fœtal head and the pelvis, the vectis may be tried, as a tractor; but the forceps is a much better instrument, for if it can be applied without force (and in no other case should it ever be attempted), we hold the power of delivery in our own hands, and unless the patient be too far gone or the operator deficient in dexterity, but little time will be lost and no mischief be done to mother or child. Even taking the statistics among the poor and worst managed part of the community, the mortality to the mother is 1 in 21, and to the child 1 in 5, which is less than that attendant upon other operations.

I have therefore no scruple whatever in recommending a trial with the forceps before using the crochet, in every case where there is sufficient space, except where the child is dead, or where extreme dispatch is necessary.

If the state of the mother preclude all consideration for the child, or if it be dead, then the perforator and crochet may be used, the great advantage of this operation being the facility of delivery when the bulk of the head is reduced, and its disadvantage, the damage done to the child. I shall speak more in detail about these operations by and by.

422. If the case be from the beginning under our own care, and our interference be well-timed and ably executed, in all probability the patient will recover well; but if she have been neglected and allowed to run down before assistance was rendered, unpleasant consequences may follow, as, for instance, the *nervous shock* may be severe or even fatal; the patient sinking twelve or twenty-four hours after delivery, without ever rallying after the operation.

Again, from the long-continued pressure of the head of the child upon the soft tissues of the pelvis, inflammation may arise, and unless subdued may terminate in abscess between the vagina and rectum; in sloughing of the vagina with or without perforation of the bladder or rectum; or the contusion of the parts may be so severe as to cause the patient to sink; or lastly, peritonitis or hysteritis may be developed somewhat later.

Such serious consequences, which are unfortunately but too frequent, indicate the necessity not merely of terminating the labour by judicious and timely aid, but also of attending minutely to the local condition of the patient for some time after delivery. Especial directions should be given to the nurse to syringe the vagina two or three times a day with tepid milk and water, to bathe the external parts with a weak mixture of spirit and water, and to place between the labia a strip of lint smeared with simple cerate, and if necessary we should satisfy ourselves by a careful examination as to the state of the parts. If much inflammation arise, a large soft poultice of linseed meal, or "stirabout," may be applied over the external parts, and black wash to the vulva.

I must beg of the reader to re-peruse the chapter on abnormal convalescence, in connection with this and some of the subsequent chapters, as the deviations therein described occur most frequently after the most dangerous labours.

423. Before concluding this chapter, I would wish to allude more distinctly than I have as yet been able to do, to an interesting though not numerous class of cases, exhibiting the symptoms more or less intense of powerless labour, with the exception of the inefficiency of the pains. The pulse is rapid, the patient very feverish, the head may be affected or the abdomen tender, &c.; yet the labour, though sufficiently tedious to give rise to these symptoms, does actually advance and may be completed by the natural efforts, but at a serious expense to the mother, and great risk to the child. I was called to such a case some short time ago; the patient was allowed to deliver herself, and she died of the shock in a few hours. The local injury already described is also more frequent after these cases than even after those where assistance has been given.

I know not any cases in which the physician has more need of all the tact and judgment which experience only can give, nor any more difficult

to describe in a book so clearly as to guide the junior practitioner, than such as these. The natural powers are not inadequate to the delivery, yet bad symptoms are present, the danger imminent, and greatly increased by delay. On the one hand, we have to guard against unnecessary interference, and on the other, against the evils of hesitation when assistance is required. As it is clear, that the possibility of the labour being finished by the natural powers alone, is not in itself a prohibition of all interference, I can only repeat that the necessity for our aid, and the time when it ought to be given, must be deduced from a careful estimate of the present symptoms, and the rate at which they have been developed, and if we find that the probable time required for the completion of the labour will be so great as to add to the patient's risk, then ought we undoubtedly to put in requisition all our resources for her liberation.

CHAPTER VII.

PARTURITION.—CLASS II. UNNATURAL LABOUR. ORDER 3. OBSTRUCTED LABOUR.

424. Definition. — The progress of the labour is impeded by some mechanical obstruction in the passages, connected with the soft parts, which by causing delay in the second stage, leads to the development of the symptoms of powerless labour.

425. Symptoms. —In the last chapter I stated that delay in the second stage of labour gives rise to a certain series of formidable symptoms, no matter what be the cause of delay; and we there considered such causes as act upon the uterus, impeding its action or diminishing its force. In the present chapter we shall investigate certain other causes of delay, such as are found in the soft parts of the passages.

The symptoms in the two orders will be the same, if the amount of delay be equal; but there is this difference from the commencement, that in obstructed labours, the uterine action is intact, nay, perhaps more vigorous than usual, but ineffective in proportion to the magnitude of the obstacles. If they be not very great, the augmented force brought to bear upon them may be successful; if they be considerable, delivery may be impossible without assistance; and lastly, in some extreme cases, delivery "*per vias naturales*" may be impossible.

Making allowance for different constitutions, the symptoms developed during the progress of labour will be in proportion to the prolongation of the second stage, as laid down in the last chapter. It will be remarked, however, that some of the causes I am about to enumerate, act upon the first stage. They certainly do prevent its completion, and by rendering the progress of the labour mechanically impossible, do really give rise to the unfavourable symptoms, and so far may be taken as an exception to the conclusion that no evil arises from a prolongation of the first stage. However, I believe that in such cases, the first stage virtually terminates before the bad symptoms set in, for I have repeatedly found that where

the physical impediment exists at the brim, whether it be a tumour or distortion, the os uteri is fully dilatable, the membranes broken, the character and force of the pains changed as usual, &c.; in short, a transition is observed from the local and general condition of the first stage, to that of the second.

426. Causes. 1. *Minute or imperforate os uteri.*—There are cases on record in which before labour, or even for some time after its commencement, no os uteri could be detected. Mazzoni mentions having observed such, and Dr. Campbell relates two examples: "Both were first pregnancies; in the first, uterine action continued about twelve hours before the os uteri could be distinguished, when it felt like a minute cicatrix. The second woman had regular pains for two nights and a day before the os tincæ could be perceived, and she suffered so severely as to require three persons to keep her in bed. Both patients were largely bled, gave birth to living children, and had a good recovery." I was myself called to a case in which the os uteri was not discoverable until after forty hours of labour, and then it felt about the size of a small crow-quill; notwithstanding the delay and obstruction, however, the patient was delivered naturally, of a living child.

As the effect of disease, the os uteri may be contracted, and its opposite edges become adherent, so as to close it partially or completely. Again, the os uteri may be diminished and the cervix rendered undilatable, by cicatrices, the result of former injuries.

Lastly, a few cases are on record of total absence of the os uteri, as in a case which came under the care of my friend Dr. Ashwell, and which he has described in Guy's Hospital Reports, it was found necessary to make an artificial opening with the knife: the labour terminated favourably.

The amount of delay from this cause varies, but it may be very considerable, and the symptoms will be in proportion. "We may suspect," says Dr. Rigby, "that the protraction of labour arises from agglutinated os uteri, when at an early period of it, we can discover no vestige of the opening in the globular mass formed by the inferior segment of the uterus, which is forced down deeply into the pelvis, or at any rate when we can only detect a small fold or fossa, or merely a concavity, at the bottom of which is a slight indentation, and which is usually a considerable distance from the medium line of the pelvis. The pains come on regularly and powerfully, the lower segment of the uterus is pushed deeper into the cavity of the pelvis, even to its outlet, and becomes so tense as to threaten rupture; at the same time it becomes so thin, that a practitioner who sees such a case for the first time, would be induced to suppose the head was presenting, merely covered by the membranes. After a time, by the increasing severity of the pains, the os uteri at length opens, or it becomes necessary that this should be effected by art; when once this is attained, the os uteri goes on to dilate, and the labour proceeds naturally, unless the patient is too much exhausted by the severity of her labour."

427. *Treatment.*—Our first object is to see what the natural powers will be able to effect; for which purpose the patient must be managed as in natural labour, and allowed to continue her efforts for some time; there is no danger in so doing, as it will be a considerable time before any unpleasant symptom will arise.

If the continued pressure discover the os uteri, but the cervix resist still, then we may try any of the remedies advised for "undilatable os uteri" (§ 394), such as venæsection, tartar emetic, &c., and in most cases they will be found useful.

In some cases when the os uteri is more or less closed by agglutination, although, as Dr. Rigby observes, "the obstacle is capable of resisting the most powerful efforts of the uterus, a moderate degree of pressure against it, whilst in a state of strong distension, either by the tip of the finger or a female catheter, is quite sufficient to overcome it; little or no pain is produced, and the appearance of a slight discharge of blood will show that the stricture has given way."

If these methods fail, we must have recourse to the knife, and make one or more incisions as near the situation of the os uteri as possible. Moscati recommends a number of small incisions around the os uteri, for the purpose of securing its equable dilatation.*

428. 2. *Carcinoma or scirrhus of the uterus.* — Strange as it may appear, conception has been known to take place not only when the cervix uteri was carcinomatous, but when it was the seat of open cancer. Zeppenfeld, Siebold, Lachapelle, and others, have put such cases upon record. The latter author records seven cases, of whom four recovered from the delivery. Of course such a hardened and undilatable state of the cervix will offer a very serious obstacle to the descent of the child's head, and that in proportion to the extent of the disease. In a few instances it has yielded to the pressure, and the child has been born naturally.

429. *Treatment.*—Fortunately such cases are extremely rare; but from those who have been most conversant with them, we find, according to Bayle, Cayol, and Lachapelle, that some have terminated without help; others, according to Siebold, have been delivered by version; or, according to Madame Lachapelle, by the forceps and by vaginal hysterotomy. If the cervix resist all the efforts of the uterus, I suppose we must, as a "*dernier resort*," have recourse to the knife; but it is for the sake of the child only, as the mother's end will only be hastened by it, and therefore before doing it we must be sure that the child is alive. If it be not, it would be better to open the head.

430. 3. *Narrow and undilatable vagina.* — In some women the vagina is naturally small and contracted; but this is rarely a serious obstacle to the natural powers, unless it be the first child, and the patient advanced in life.

The calibre of the vagina may also be diminished by callosities or cicatrices, the consequences of former inflammation and sloughing, and which, consisting of a semi-cartilaginous substance, may form rings or spirals around the vagina, and offer great resistance to the descent of the child. These obstructions will be detected at once, on examination, by their hard gristly feel and their form.

Lastly, more or less perfect occlusion of the vagina may be present,

* The young practitioner cannot be too cautious in resorting to such operations. In first labours, the os uteri is not unfrequently found high up, in front of the promontory of the sacrum, and almost out of reach of the finger. It may remain thus for many hours undiscovered by the inexperienced, and although it may cause much delay in the labour, it will in time be brought into the axis of the strait by the force of the pains. This may be expedited, after labour has continued some time, by drawing it forward with the fingers, as advised by Baudelocque (§ 406). — Editor.

owing to the adhesion of its sides, sometimes leaving a portion of the vagina pervious inferiorly, sometimes obliterating nearly its whole length.

The impediment which a congenital narrowness of the vagina offers is overcome by patience, and pains, aided by fomentations or injections, before unfavourable symptoms arise; but when it is obstructed by adhesions or contractions, this may not take place. The labour is prolonged beyond a certain time, and then the symptoms of powerless labour (§ 412) set in, and on examination, the cause of the delay is sufficiently clear.

431. *Treatment.* — As in the cases last described, we must wait until experience has proved how far the natural powers are capable of overcoming the resistance. In some cases we find, contrary to our expectations, that after the pressure of the child's head has continued for some time, the stricture yields, and as it were unfolds, so as to permit the passage of the child. In other cases laceration takes place (not without danger) and delivery follows.

Should the parts continue to resist steadily, then we must have recourse to bleeding and tartar emetic, which will very often preclude the necessity of relief by the knife. If they fail of producing benefit within a reasonable time, we must interfere to prevent worse results, either the constitutional symptoms already noticed or local injury. My friend Dr. Doherty has very justly observed, in a paper read before the Obstetrical Society, "It is very seldom, even when a single and prominent band encircles the canal, that this is the only mischief which has been done; for generally speaking we have more or less puckering of the parietes, and not infrequently, as I have already mentioned, communications with the adjoining viscera. The consequence of these changes is that the canal is less able to bear a forcible dilatation; and if the narrowed portion be permitted to delay the fœtal head too long, a rupture of the vagina above it may occur, even if no breach of surface already exist. But if even a small opening into an adjacent cavity be already formed, it is very likely to be converted into a rent, which throws both chambers into one, constituting one of the greatest calamities which can befall a woman."

To avert such a catastrophe, we must have recourse to the knife, if the previous remedies fail; two, three, or more incisions should be made, just through the resisting band, if it be circular; but if the sides of the vagina be adherent, they must be carefully and gradually divided. The pressure of the descending head will dilate the passage. The greatest care must be taken not to wound the neighbouring viscera. The hemorrhage may be considerable, and occasionally the case terminates fatally.

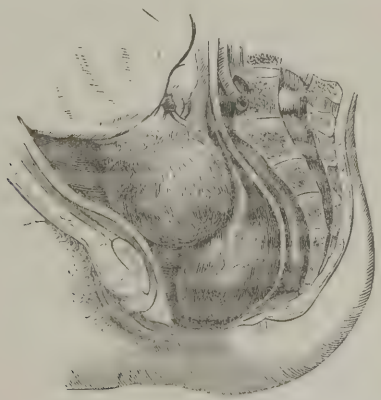
Should the uterine action be exhausted by the length of the labour, and unfavourable symptoms develop themselves, it may be necessary to terminate the labour promptly by instruments. I think it may be a question whether, in the more aggravated cases of stricture, premature labour or abortion ought not to be induced, if we are cognizant of the fact at an early period. I need not say that in the after treatment the most careful attention should be paid by the accoucheur himself to the state of the vagina, and as soon as the inflammation and tenderness subside, a bougie should be introduced daily, to guard against the re-formation of the stricture.

432. 3. *Tumours in the pelvis.* — Tumours of various pathological characters may form in the different parts of the pelvis; thus we may

have fibrous, adipose, steatomatous, sarcomatous, and scirrhous growths, and they may be situated either behind the rectum, between the rectum and vagina, or in connexion with the proper tissues of the vagina. Again, the os uteri may give origin to a tumour, as polypus. Dr. Denman met with a case of cauliflower excrescence of the os uteri.

This is not the place for the description of these various diseases, which I have fully discussed in a former volume. Our object at present is to inquire what is their effect upon labour. The obstruction they offer to the descent of the child's head will depend upon their size, their mobility, and their compressibility. If small, the delay may be immaterial, and the difficulty overcome by extra force; but if beyond a certain size, they may delay the labour so long as to give rise to the unfavourable symptoms of a prolonged second stage or absolutely prohibit the passage of the child. But this effect of their size is sometimes obviated by their mobility, *i. e.* the tumour may be pushed to one side, or drawn up out of the way of the child, as in a case published by my excellent friend, Dr. Beatty, in which the tumour was so large, and apparently so fixed, that Cæsarian section was anticipated; nevertheless at the time of labour it was elevated sufficiently to allow of the birth of the child without any assistance. In the case of polypus, too, we find that in some cases the pressure of the child's head has detached the tumour, or expelled it without separation, as related by Dr. F. Ramsbotham. Lastly, in cases where the tumour is too large and immoveable, it has been found so far compressible, that after some delay and extra compression of the child's head, the labour has terminated naturally.

Fig. 88.



Polypus Uteri.

The chances in favour of the tumour being elevated or pushed out of the way, are increased in proportion as it is high up in the pelvis; next to these the most favourable situation is on one side of the promontory of the sacrum, and the least so, in the antero-posterior diameter. The difficulty occasioned by the size is augmented by the hindrance they offer to the adaptations of the head and to its successive changes of position.

433. When we have reason to believe in the presence of any of these tumours, a most particular investigation should be instituted. The examination, as Mr. Ingleby observes, "should be made in the absence of pain, and (if possible) before the presentation has become engaged in the pelvis, lest the tension which the mass undergoes during strong labour should obscure the diagnosis. If the presentation be in part only below the brim, it may be difficult to determine whether the apparent firmness of the tumour is not owing to obstructed circulation. Whilst making the usual examination "*per vaginam*," it will be advantageous to pass the fore-finger of the left hand into the rectum with a view of ascertaining more correctly the contents of the tumour." *

434. *Treatment.* — If, owing to the moderate size of the tumour, its mobility or compressibility, there is a probability of the natural powers being adequate to the delivery, we have nothing to do but to wait patiently; but if the delay be so excessive as to threaten bad symptoms, or if the obstruction be insurmountable, we must then afford assistance, and the mode will depend upon the size, mobility, contents, or mode of attachment of these tumours.

Thus if the tumour be moveable, and we see the patient sufficiently early, we should endeavour to raise the tumour above the brim of the pelvis, as was done by Dr. Merriman, during an interval between the pains, and maintain it there during the next pains, so as to allow the head to become engaged in the brim; if we succeed, the labour will go on regularly; but if, as is most frequent, we fail, we must then try if the tumour be removeable. If it be a cauliflower excrescence or a polypus, it will be advisable to pass a ligature around it, and remove it. In the case of polypus this has repeatedly been done with impunity.

Other tumours have been removed, as in Mr. Drew's case of one between the vagina and rectum, with success; but this is a much more serious operation, and should not be attempted until we are certain that its bulk cannot be reduced in another way.

Many of these tumours are composed of fluid or semi-fluid matter, and such may be emptied by passing a trocar and canula, or by a free opening with the scalpel; after which the walls of the cyst will subside, and allow of the passage of the child. This operation should always be performed before we attempt delivery by operating upon the child.

If a slight operation upon the tumour is likely to be successful, there cannot be the slightest doubt that it ought to be preferred, nor do I myself feel that we should be justified in sacrificing the child, where there existed any hope of being able to extirpate the tumour.

435. But suppose the tumour be solid, immoveable, and incompressible; then it is clear that our only means of delivery is to act upon the child, and the mode will depend upon the size of the tumour. If it be small, though sufficient to obstruct a labour attended with feeble pains, then perhaps the addition of extracting force by means of the forceps may suffice. These cases, however, are very rare, and we must take care that the force employed do not add to the subsequent risks, by inducing the evil results of excessive pressure upon the soft parts of the mother.

* Facts and Cases in Obstetric Medicine, p. 121. I beg to refer the reader to this excellent essay, and to Dr. Merriman's paper in Med. Chir. Trans. vol. x., for much valuable detail which I have been obliged to omit.

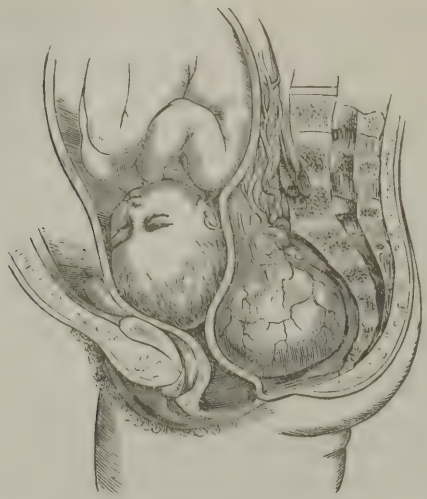
If the tumour be too large to allow of the use of the forceps, or if they have been tried unsuccessfully (extirpation being out of the question), we have then no alternative but the reduction of the bulk of the child by craniotomy, and, if necessary, evisceration. This, however, is so painful an alternative, that it should never be thought of until we are satisfied that nature is inadequate to the delivery, that the obstacle cannot be pushed aside, nor removed nor lessened by puncture, &c., and that interference has become a duty to the mother.

Some few cases occur in which even craniotomy will not enable us to effect the delivery; in which the pelvis is very nearly filled by a firm incompressible tumour, as in the case related by Dr. Montgomery, and others. We have no remedy for such, except by providing an artificial exit for the child by performing the Cæsarian section; a formidable and very fatal operation it is true, but which is infinitely better than leaving mother and child to perish. But before having recourse to it, we must be perfectly satisfied that no other means affords a hope of success, and I need hardly add, that none of these serious operations should be undertaken without a consultation, if that be possible.

436. 5. *Diseased ovary.* — The ovary may be enlarged from disease originating previous to or during pregnancy, and not suspended by it. The enlargement is sometimes solid, but more frequently it contains fluid or matter of the consistence of honey. If the disease progress slowly, the uterus with the ovaries by its side, may have emerged from the pelvic cavity in time to remove the obstacle, which will then be in the abdominal cavity. But in other cases, either from the situation or rapid increase of the ovarian tumour, or by adhesions between it and the neighbouring parts, it is retained in the pelvis, and may offer serious obstruction to the second stage of labour. "There are two forms of ovarian tumour," says Mr. Ingleby, "which obstruct the passage of the child. In the one a small cyst in connexion with a very bulky cyst, or else a portion of a large cyst, passes into the recto-vaginal septum, and bulges through the posterior part of the vagina. In the other, and that which occurs by far the most frequently, the whole ovary, moderately enlarged, prolapses within the septum. The descent is peculiarly liable to happen at two periods: the first, near the end of gestation; the second during labour; the prolapsus being promoted by the relaxation of the soft parts. The changes which the ovary undergoes when long detained in the septum, will depend upon the capacity and yielding state of the parts. If the woman have not previously borne children, it may remain small, and scarcely retard delivery: but under contrary circumstances, it acquires a large size, and nearly fills the vagina. In rare cases, the bulging is said to have appeared at the anterior part of the pelvis. Again, the ovarium when moderately enlarged and confined within the abdomen, may alter the course of the gravid uterus in its ascent out of the pelvis, so that the organ can neither preserve its perpendicular direction, nor freely develope itself on the side on which the tumour is situated, and thus the lateral obliquity, as described by writers, is almost necessarily produced. Although this mal-position of the uterus may fail directly to obstruct the entrance of the presentation within the brim, the axis of the organ as respects the pelvis, is no longer maintained, and labour will probably prove tedious.

The observations made upon other tumours in the pelvis are in most respects applicable to enlarged ovaries. There will be delay in the second stage, or the head will be prevented altogether from entering upon this stage, in proportion to the size, immobility, and incompressibility of the

Fig. 89.



Ovarian tumour.

tumour; modified in some degree by its situation. But an ovarian tumour is much more likely to be moved out of the way of the child at the time of labour, than any other, and also more apt to give way and burst under the pressure of the head.

The *diagnosis* is not always easy. If the tumour within the recto-vaginal septum be moveable, elastic, and communicating to the finger a sense of fluctuation, it is probably ovarian; but it is not always thus; it may be hard, not fluctuating, and, in fact, to the touch apparently solid. In such cases the only test we can apply practically, is puncture.

437. *Treatment.*— We must first allow time to see whether the tumour may not be displaced by the efforts of nature, and also to estimate the effects of pressure upon it, and we shall have time for this before the bad symptoms appear. If the obstacle be insurmountable by the natural powers alone, and cannot be raised above the brim of the pelvis by the hand, we must then puncture the cyst through the vagina, nor are we to be deterred from this on account of the apparent solidity of the tumour, as many such contain fluid. A long trocar should be used, and plunged quite through the parietes of the tumour. If fluid be freely evacuated, we shall have no further trouble with the labour: if it be viscid, and do not pass freely through the canula, the opening must be enlarged.

But suppose the tumour should really prove to be solid, and cannot be pushed above the brim; it is clear that we cannot attempt to extirpate it in such a case, and we must then act upon the child. Version has been proposed, but it appears to me very unsuitable, it adds much to the

mother's risk without increasing in any degree the probability of saving the child: the tumour would offer even a greater obstacle to the passage of the head reversed, than in its natural position.

If the tumour though solid be small, perhaps a little additional power might enable the child's head to pass without injury to mother and child, and in such a case the forceps might be used, but I do not think suitable cases for this instrument are frequent.

If all these plans fail, or are unsuitable, we have no resource but to evacuate the brain, and, if necessary, the contents of the chest and abdomen, and then extract the child.

Dr. Merriman has collected eighteen cases, and it appears "that *twice* the labour was effected by the pains, unassisted by the art of the accoucheur; but one of these lost her life, and one of the children was still-born. *Five* times the perforator was used after a longer or shorter duration of labour: three of these women died, another recovered very imperfectly, and one got well. *Five* times the labour was terminated by turning the child: all the children were lost, and one only of the mothers recovered. *Three* times the tumours having been opened, the labour was afterwards trusted to nature: two of these women recovered, but the other remained for a long time in an ill state of health: two only of the children were preserved. In *three* cases the tumours having been opened, it was still found necessary to have recourse to the perforator: one of these women died; one remained in an ill state of health for eighteen months, and then sank under her sufferings; the third recovered. Thus, in 18 cases, it appears that of the women, 9 died,

3 recovered imperfectly,

6 perfectly.

Of the children, 15 were still-born,

3 were alive.

"Upon the whole," Dr. Merriman concludes, "the evidence we at present possess, is more in favour of opening the tumours, when they contain a fluid, than of any other mode of procedure; for of the nine women who recovered more or less perfectly, five appear to owe their safety to this operation, and of the children born alive, two were preserved by the same means."

In these cases the mortality to the mothers was very great, and though in all cases there must be risk at the time and subsequently, still there is reason to hope that a cautious estimate of the value of the different means at our command, and a timely and judicious employment of them, will insure a more favourable result. In such cases it must be borne in mind that whilst the obstacle occasions the necessity for the operation, the time must be decided by the constitutional symptoms, or, at least that assistance must never be delayed after the symptoms of powerless labour set in.

438. With respect to all tumours of the pelvis which have rendered the use of the perforator necessary, I would wish strongly to recommend the induction of premature labour in the next pregnancy, at such a period as shall supersede the necessity of an operation, provided that the size, situation, and density of the tumour continue the same.

439. 6. *Vaginal cystocele.*—I have already spoken of the necessity of keeping the bladder empty, as its distension very often protracts the labour; but the effects may be more serious, if from frequent child-bearing,

the posterior and inferior supports of the bladder have been weakened, for then it may overlap the brim of the pelvis, and be caught by the head of the child in its descent, and pushed before it into the cavity. Fortunately such cases are very rare, for their consequences may be very serious.

The patient will complain of fulness, tension, a feeling of pressing down and dragging, with a desire to evacuate urine frequently, and of inability to do so. On examination we detect a tumour, in front of the pelvis, partially covering the head, and containing fluid. The finger passes easily posterior to the tumour but not anteriorly, and the catheter cannot be passed in the usual direction, indicating clearly its nature. With care, there is not much danger of an incorrect diagnosis, but if not on our guard we may mistake it. Dr. Merriman relates a case where the bladder was perforated on the supposition that it was a hydrocephalic head, and Dr. Hamilton used to mention one in his lectures, where it was mistaken for the bag of the waters, and punctured.

No doubt a bladder sufficiently distended and prolapsed must occasion difficulty and delay in the second stage, but the danger to the mother from the rupture of that organ is at least equal to the risk of mischief from the delay.

Fig. 90.

440. *Treatment.* — This double danger renders it necessary that when we are assured of the nature of the impediment, we should be prompt in our endeavours to remedy it. A male elastic catheter must be introduced, with the point directed downwards and backwards, and if the head have not descended too low, we shall probably be successful in emptying the bladder. The head may also be raised a little with the finger during an interval to facilitate the introduction. Even if we succeed, it will be necessary to watch carefully against the effects of the previous pressure; but if we fail, and either the labour be arrested by the obstacle, or the pressure threaten a rupture, our only recourse, I believe, is to tap the bladder with a very fine trocar, through the vagina. Let me, however, impress upon my junior readers the necessity of being quite certain of the nature of the

case, and of the prolapsed bladder being really an impediment, or in danger of rupture, before attempting so serious an operation.

Should the quantity of urine be moderate, and the pressure not excessive, and especially if the head of the child be small, the case may perhaps, be left to nature; but then, after the labour is over, we must immediately evacuate the bladder, and watch the patient carefully.

441. 7. *Calculus in the bladder.* — It is very rare that urinary calculus has been found an obstacle to labour; but such cases are on record. Guillemeau was the first to relate one: the result was contusion, sloughing, and vesico-vaginal fistula. La Gonache performed the operation of lithotomy under similar circumstances, and extracted a calculus eight inches in circumference. Smellie relates a case which occurred in the practice of Mr. Archdeacon, in which the calculus was expelled by the pressure of the head (I suppose through the urethra), after a long and tedious labour: the patient suffered from incontinence of urine afterwards. M. Dubois detected a calculus in the bladder pressed down by the head of the child; and M. Philippe of Rheims extracted one in the fifth month of pregnancy.

So long as the bladder and calculus remain above the brim of the pelvis, no mischief will result; but if it project backwards, and be caught by the head, and pushed down before it, the bladder will be seriously bruised, and the labour impeded in proportion to the size of the calculus.

A careful examination will show that the tumour is covered by the bladder, and its hardness will indicate its nature.

442. *Treatment.* — If the calculus be discovered during the first stage of labour, it may be possible to raise it above the brim, and to maintain it there until the head is engaged, after which there will be no danger; but if we cannot do this, I fear our only resource is vaginal lithotomy; as it is much better to have to deal afterwards with an incised wound than a laceration.

443. 8. *Vaginal hernia.* — It is very possible for a loop of intestine to slip down behind the uterus into the "*cul de sac*" between the vagina and rectum, and if it be empty, it will be no impediment; but if it contain a mass of scybala, that will form an obstacle to the descent of the head, but one that is seldom attended with danger, except from the pressure to which the intestine is exposed.

444. *Treatment.* — If the hernia can be reduced, it must be done as early as possible; but if not, we may be able to deliver with the forceps. It is very rarely, if ever, necessary on this account to lessen the child's head.

445. 9. *Collection of fæces in the rectum.* — This is not a very uncommon cause of delay towards the end of the labour, nor is such an accumulation inconsistent with frequent and fluid, but small, evacuations daily. It is easily detected; the tumour is felt in the situation of the rectum, and its irregular form and want of elasticity would almost be sufficient to indicate its nature. It is possible, however, to press it downwards, and then the escape of fæces will put the question beyond doubt.

446. *Treatment.* — If proper care have been taken during pregnancy, and the first stage of labour, we shall never be troubled by this obstacle; but if not, we must remedy the neglect by enemata of warm water whenever we detect the state of the intestine; and if, as in rare cases, this be not sufficient, the fæces must be removed by a spatula or scoop.

447. 10. *Swelling of the soft parts.* — The late Professor Hamilton was, I believe, the first to notice this state as an obstacle to the delivery of the head. Dr. Campbell observes, "The capacity of the pelvis may be diminished by general tumefaction of its linings, consequent on interrupted circulation, from a long detention of the child's head, or from frequent examination. This cause of protraction is one of no ordinary nature, since, unless the case be promptly and energetically attended to, the result may be calamitous from lesion of structure. Unless a practitioner have had the management of the patient from the commencement of labour, he is apt to view this variety of diminished capacity, as arising from original defect in the development of the bones themselves."

448. *Treatment.* — Great relief is afforded by venæsection; and if necessary, small doses of tartar emetic should be administered. Dr. Campbell advises the application of the forceps, if there be room; but if the pains be adequate, I would rather leave the labour to the natural efforts, because of the risk of injuring the passages. If the pains be feeble, we must, of course, expedite the delivery.

449. 11. *Imperforate hymen.* — Impregnation is quite possible without injury to the hymen: cases have been recorded repeatedly of women, in whom the hymen was found perfect at the time of labour. I myself attended one a short time ago. In most cases the membrane yields to the pressure of the head at once; but it may (as in the case I attended) offer a long resistance; though I am not aware of its having ever been the cause of powerless labour.

450. *Treatment.* — The remedy is very simple; if the hymen do not yield to the pressure of the head after a reasonable time, it must be divided by the scalpel. A very slight incision will suffice, and great care must be taken so to support the perineum, as to prevent the laceration extending beyond the fourchette.

451. 12. *Rigidity of the perineum.* — I mention this among the causes of delay, especially in women of mature age, although I believe it never occasions such delay as to give rise to unfavourable symptoms, except when a tough cicatrix has formed after a former laceration.

In ordinary cases of excessive resistance, much benefit will be derived from venæsection and tartar emetic, followed by fomentations, or gentle friction with hog's lard. If it be clear from any cause (though such cases must be extremely rare) that the perineum cannot dilate, an incision must be made through the obstacle.*

452. Other causes have been enumerated as protracting the second stage, as tumours of the labia, prolapse of the uterus, &c.; but though, to a certain extent, they may have such an effect, yet not so far as to give rise to the symptoms of powerless labour. Prolapse of the uterus at the time of labour can only be partial, and must arise from excessive amplitude of the pelvis: careful pressure around the external orifice will retain it within the vagina, and the child will be expelled naturally. The only

* In rigidity of the parts, especially the os uteri and perineum, many eminent obstetricians have reported favourably of the inhalation of ether. "Although greatly opposed to the free use of this powerful agent, under all the circumstances indicated by Dr. Simpson, I should not hesitate," says Dr. Huston in a note to a former edition, "after the employment of other suitable means, to resort to that, or, what is perhaps better, chloroform, before using the knife, in simple cases of rigidity of the parts mentioned." — EDITOR.

labial tumour that is at all likely to call for interference is that caused by sanguineous effusion, which seldom occurs until the head arrives at the outlet, and does not generally prevent the exit of the child. If it should do so, it must be opened; and if, after that, the delivery do not speedily take place, the forceps must be used. Brevity of the umbilical cord, or its coiling, has also been said to delay the descent of the child; but, I believe, without any reason. Those who supposed this, remedied it by dividing the cord, which I believe to be very rarely necessary.

453. Symptoms. — It is unnecessary that I should do more than allude to the symptoms which arise, when, in consequence of any of these causes, the labour is delayed in the second stage; as I have fully described them under the head of powerless labour, from which they differ in nothing, except that we do not so frequently find the character of the pains changed. It is evident that the fault is not in the want or inefficiency of pains, but in the obstacles opposed to them. The symptoms then will be in proportion to the delay, making due allowance for difference of constitution and temperament, and the delay will be in proportion to the extent of the obstruction, assuming that no interference has been attempted.

For some time (from 12 to 20 hours) after the first stage has been virtually (§ 425) or really completed, the labour will go on apparently favourably; but after this, the pains producing no effect, we find that the patient becomes feverish, restless, and thirsty; the pulse rises, the skin is hot, the tongue dry and furred, and the gums and teeth coated with sordes. In some cases, but not always, the character of the pain is changed; the outcry and suffering increased, but the force diminished and the voluntary efforts suspended.

If the patient be neglected, the unfavourable symptoms increase: the abdomen becomes tender, and sometimes tympanitic; vomiting is frequent; the urine is retained; the vagina is hot and tender; the discharge becomes yellow or brown, and perhaps offensive; violent rigours occur, and the patient is irritable and despondent, and ultimately sinks into a delirious or comatose state.

454. Prognosis. — In any case to which we are called, our prognosis must depend upon the actual state of the patient, and the possibility of removing the cause, or the facility with which labour may be terminated by instruments. If called early, before bad symptoms are developed, and the cause of delay be one we can remove, the prognosis will be favourable, as far as delivery is concerned, with a reservation as to the results of the operation necessary for the removal of the cause. If the obstacle cannot be removed, and we are obliged to operate upon the child, there will be, in addition to the usual risk of the operation, something additional in proportion to the difficulty of extraction. If we be not called until serious symptoms appear, the shock of any operation will add much to the patient's danger, and our prognosis should be very guarded. In these cases it should be distinctly stated that, although there is danger to the patient if the operation be attempted, there is much greater danger, or perhaps the certainty of death to mother and child, if nothing be done.

455. *Treatment.* — For each cause of delay I have mentioned the special treatment necessary. I shall, therefore, now merely recapitulate a few general principles. 1. In no case need we interfere, when the obstacle can be overcome by the natural powers within a reasonable time.

2. That the less serious the mode of interference the better; so that, if the natural efforts are insufficient, we should endeavour to push the obstacle out of the way; to remove it; or to puncture it. 3. That if the uterine efforts be vigorous, the mere removal of the obstacle will enable them to complete the labour. 4. That in some cases, besides removing the cause of delay, it is necessary to employ extracting force; and in such cases, the less violent the operation the better: thus the vectis (if effectual) would be preferable to the forceps; the forceps to the crotchet, and the crotchet to the Cæsarian section. 5. But in our estimate of the risk of these operations, we must not omit the time they occupy, with reference to the condition of the patient; thus the time gained by the forceps may render it more useful than the vectis. 6. When the forceps cannot be used, no false humanity should make us hesitate to destroy the child (I assume, of course, the necessity for an operation) in time to save the mother; because its life was sacrificed already, and both it and the mother will be lost, if we do not terminate the labour.

CHAPTER VIII.

PARTURITION.—CLASS II. UNNATURAL LABOUR. ORDER 4. DEFORMED PELVIS.

456. Definition. — The progress of the labour impeded by abnormal deviations in the form of the pelvis, giving rise to delay in the second stage, or rendering the descent of the child impossible without assistance, or altogether impracticable. The symptoms are those of powerless labour.

457. If the reader will have the kindness to turn back to the chapter on "abnormal deviations of the pelvis," he will find that I there described the following variations from the ordinary standard: 1, the equably enlarged pelvis *(pelvis æquabiliter justo major)*: 2, the equably diminished pelvis *(pelvis æquabiliter justo minor)*: 3, special distortions of the brim: 4, of the cavity: 5, of the lower outlet: and 6, oblique distortion. As in that chapter these deviations were described and the means of diagnosis pointed out, it only remains for us now to consider their effect upon the labour, which I shall do in a few words.

458. 1. The "pelvis æquabiliter justo major," can scarcely be included in the practical consideration of the effect of distortion: but as it does modify the labour, a few words may not be amiss. As the adaptations of the child's head to the pelvis, and the changes observed in its descent, depend upon the combined effect of the propelling force and the resistance, it is clear that if the pelvis be so large as to afford little or no resistance, these changes will not take place; nor is that of much consequence. Further, the absence of resistance will render the labour so rapid as to preclude due preparation on the part of the mother, as in the cases related by Drs. Montgomery and Rigby. In one, a patient of Dr. Douglass, the child was born in the night without waking the mother. Now are these rapid labours from deficient resistance, without inconveniences: the uterus may be depressed to the edge of the vaginal orifice, and even somewhat beyond it, and there is certainly more danger of subsequent hemorrhage.

The only danger to the child arises from the chance of its falling on the ground, when expelled without warning.

Little can be done in such cases, even if we happen to be in time, except to support the external parts so as to prevent partial prolapse of the uterus, and by pressure over the uterine tumour to guard against flooding. During convalescence, the patient should be kept a longer time than usual in the horizontal position.

2. The opposite extreme, the "pelvis æquabiliter justo minor," may offer very serious resistance to the progress of labour. In general, however, it renders the labour difficult and tedious, but not impracticable by the natural powers. The moulding and adaptation of the fœtal head occupies a longer time, the compression is greater, the pains more violent, and the second stage more prolonged, but the amount of delay varies, and its effects also upon the constitution of the patient.

459. 3. The special distortions of the brim are very important, and it may be generally remarked, that a small special deformity will prove a greater obstacle than the same amount of equable diminution of size. When the oval of the brim is transposed so that the antero-posterior diameter is the longer, the position of the child's head will of necessity be changed, so as to bring its long diameter in accordance with that of the pelvis. The heart-shaped brim may have no influence upon the head unless the promontory of the sacrum be much projected; then we shall find a corresponding indentation upon the skull of the child, and perhaps a fracture of one of the bones, as remarked by Dr. Michaelis of Kiel. And not only this, but the head, if prevented from freely entering the pelvis, and if the pains be very violent, and the patient have had several children, may be driven to one side, and the cervix being unable to resist the pressure may give way. If the distortion be excessive, it may preclude the entrance of the head altogether.

4. Distortions in the cavity may be merely a continuance of deviations in the brim, or they may be limited to the cavity; in the latter case we may find the head enter the pelvis with tolerable facility, and descend in the usual manner, until it arrives at the impediment. If the sacrum be too straight, there will be danger of the head being driven through the perineum for want of the forward direction which is ordinarily communicated to it by the curve of the sacrum: on the other hand, too great curvature of the sacrum may be a serious difficulty, even insurmountable without assistance, or if overcome, it may exert injurious pressure upon the skull of the child. Exostosis of the sacrum will prove an obstacle in proportion to its size: if small, it may be overcome by the uterine efforts alone, or with assistance: if large, it may be incompatible with the delivery of a living child, or even a mutilated one.

5. Distortions of the lower outlet may depend upon those in the upper part of the passages, or which is rare, they may occur alone. The latter consist generally in an approximation of the tubera ischii, or narrowing of the pubic arch, or in anchylosis of the coccyx. If the pubic arch be narrowed, the antero-posterior diameter of the lower outlet is virtually lessened, because the head cannot fill the arch, but is thrown backwards, upon the os coccygis. If the coccygeal joint be anchylosed, that will also diminish the antero-posterior diameter of the outlet; and if it be not broken by the expulsive force, it may indent or fracture the bones of the

cranium. When the pelvis is funnel-shaped, the resistance will not be felt until the head is at the lower outlet, and it may then require assistance.

6. Oblique distortions of the pelvis offer great obstruction to the passage of the child, and although, if slight, a modification of the usual adaptations of position may allow its descent, yet in many cases it is requisite to interfere and terminate the labour artificially.

460. So far, I have merely sketched the kind of influence which the various deformities are calculated to exert upon the labour; but another most important consideration remains, viz., the amount of the difficulty. A due appreciation of the limitation caused by the distortion, is absolutely necessary to the practical management of such cases, and in forming our judgment, we must take into account the relative as well as the positive size of the apertures or cavity; for although they should be much reduced, yet if the fœtal head be very small, there may be comparatively little difficulty; and, on the other hand, if the head be large and the sutures ossified, a very slight diminution of the usual capacity of the pelvis will offer great obstruction. In a practical point of view, we may make three degrees of distortion: first, where the pelvis is sufficiently reduced in size as to offer an amount of difficulty which in some few cases may be overcome by forcible pains, if time be allowed, but which generally require extracting force in addition; there being space enough to allow the use of the forceps. Secondly, where the head is unable to enter the pelvis, or having entered, is tightly wedged in the cavity, or impacted, as it is called. In these cases, there is not space enough to admit the forceps, nor if they could be introduced, would the head bear the compression necessary to enable us to extract it; there is no resource but to evacuate the contents of the cranium. Thirdly, there are very rare cases of extreme distortion, where the canal of the pelvis is so reduced that it would be impossible to extract even a mutilated child.

461. It is not easy to name the actual diameters, answering to each of these classes, because, as I have already observed, the size of the pelvis must always be considered relatively to the child's head. But thus much may be stated, that a living child cannot pass through a pelvis whose small diameter is less than three inches. M. Le Roi fixes upon $3\frac{1}{4}$ inches, Drs. Osborn and Aitkin 3 inches, Dr. Jos. Clarke $3\frac{1}{2}$, Dr. Burns $3\frac{1}{4}$, Dr. Ritgen 2, Dr. Busch $2\frac{1}{2}$ to 3 inches, as the smallest diameter. It is clear then, that unless there be a space of full three inches, it would be useless, probably injurious, to use the forceps. If it be under this, the case will belong to the second class, in which the perforator and crotchet must be used, provided that there be space enough for the extraction of the child after mutilation. Dr. Osborn states that one inch and a half diameter will be space enough for this purpose. M. Baudelocque conceives that craniotomy is inadmissible when the diameter is only an inch and two-thirds; Dr. Dewees when it is less than two inches; Drs. Hull and Burns think that it may succeed when it is an inch and three-quarters; Drs. Gardien and Hamilton when it is an inch and a half; and Dr. Davis when it is one inch. If it be much below two inches, the case will come under the third class, and our remedy be the Cæsarian section.

462. If deformity be suspected, an external as well as an internal examination should be carefully made: if we can reach the promontory of the sacrum and the presentation, we can then estimate the relative size of the head and brim: if the presentation be beyond reach, we may still

be able to ascertain the distance between the sacrum and pubis with tolerable accuracy. In addition there is a peculiarity about the first stage of labour. "Besides the general appearance of the patient," says Dr. Rigby, "we frequently find that the uterine contractions are very irregular; that they have but little effect in dilating the os uteri; the head does not descend against it, but remains high up; it shows no disposition to enter the pelvic cavity, and rests upon the symphysis pubis, against which it presses very forcibly, being pushed forwards by the promontory of the sacrum." There is less difficulty in detecting the disproportion in the cavity or lower outlet, as it is within reach: and on examining during a pain we find that no progress is made, and during an interval we can perceive that the head is larger than the passage it has yet to traverse.

463. Symptoms. — If the labour be allowed to continue beyond a certain time, we shall have all the constitutional symptoms of powerless labour (§ 413), except, perhaps, the change in the pains, because the delay is in the second stage, really or virtually. It is true the head may not be able to clear the os uteri on account of the obstruction at the brim, but the os uteri becomes softer and dilatable, the pains forcing, and the cry suppressed; all marking the transition from the first to the second stage, and it is never until after this change that bad symptoms set in.

But besides these constitutional symptoms, which I need not recapitulate, other effects not unfrequently result, even where we are successful in delivering the patient. The long and forcible pressure of the head of the child against the soft parts at the brim and in the cavity may be followed by inflammation and sloughing. Thus the lower part of the uterus and the vagina may be seriously injured, and if the slough be deep, the bladder or rectum may be perforated. I have already pointed out the possibility of rupture of the uterus.

The child, too, may suffer considerably: if the head enter the brim and be much compressed, its life may be sacrificed; or partial pressure on any part may fracture one of the bones of the cranium, or give rise to inflammation or sloughing of the scalp.

464. Treatment. — If the distortion be slight, it is possible that the extra force which will be exerted, may be sufficient after a longer time for the expulsion of the child, and a fair trial should be given. But if the disproportion be so marked that it is evident that the child cannot pass without assistance, or if unfavourable symptoms are present, we ought to lose no time in determining by the degree of deformity to which of the classes (§ 460) the case belongs, and acting accordingly. If it come under the first, and there be space enough, we may try the forceps; if under the second, craniotomy, and, if necessary, evisceration will be our only resource; if under the third, the Cæsarian section. I will caution my junior friends against coming to a conclusion and acting upon it without a consultation.

The greatest care will be necessary after delivery to guard against the consequences I have mentioned. Vaginal injections of warm water should be used twice a day, and a few leeches applied to the vulva if necessary. I have found great benefit from the exhibition of small doses of calomel and opium at moderate intervals, or of a full dose of opium at bed-time in these cases.

I shall now proceed to consider in detail the operations to which I have as yet only slightly referred.

CHAPTER IX.

OBSTETRIC OPERATIONS.

1. INDUCTION OF PREMATURE LABOUR.

465. Very little need be said as to the importance of obstetric operations: the danger to the mother and child, the circumstances under which they have been performed, and the little time which is allowed for reflection, or consulting authorities, all point out the absolute necessity of our being prepared beforehand for any case which may occur. If any further inducement were required, I might add, the influence which a successful or unsuccessful operation has upon the reputation of a practitioner, or refer to the fact which the periodicals attest, that a surgeon may be indicted for the results of his operations. But I prefer supposing that a conscientious feeling of our responsibility in undertaking the charge of a case, will be the strongest inducement to the acquisition of that knowledge, which is the safeguard of those who confide in us. It is, I believe, an axiom, in which I fully concur, that no operation should be attempted without a consultation, if it be possible to obtain one.

In estimating the dangers of any operation we must always take into consideration the prevalence of any epidemic. If, for example, puerperal fever or erisipelas be epidemic, the danger of any operation is increased incalculably.

Obstetric operations may be divided into three classes: 1, those which are *not intended* to injure the mother or child, as the induction of premature labour, version, the use of the vectis, and the forceps; 2, those which involve the destruction of the child, but which are *not intended* to injure the mother, as craniotomy, and the cephalotribe; and 3, those in which danger is involved to both mother and child, as the Cæsarian section.

I have said, "not intended to injure," because I would not mislead my junior readers, by leading them to suppose that any operation is without danger to both mother and child. They are all dangerous, but in different degrees, as we shall see by and by.

Now let us examine each in detail.

466. 1. The Induction of Premature Labour, for the purpose of saving the life of the infant, of its mother, or of both, though of comparatively modern origin, is an operation of great value in certain cases, and it is one of the few instances of an improved science augmenting the number of operations.

There would appear to be, in the minds of all men, a repugnance to interfere with the natural progress of those great phenomena which ordinarily run a definite and uniform course; and in the present case this objection is increased, because the proposed interference is to remedy one irregularity by another. Accordingly, the first consideration has always been, not the *usefulness*, but the *morality* of the operation. Dr. Denman

states* that Dr. Kelly informed him "that about the year 1756, there was a consultation of the most eminent men at that time in London, to consider the *moral rectitude* of, and the advantage which might be expected from, this practice, which met with their general approbation." The conclave decided in favour of the morality of such interference, and shortly afterwards the operation was successfully performed by Dr. Macaulay. Subsequently, Dr. Kelly "practised it, and among other instances, he mentioned that he had performed this operation three times upon the same woman, and that twice the children had been born living."

So numerous, and, upon the whole, so successful have been the instances in which it has been tried since Denman's time, that it has taken its place among the regular obstetric operations, in the various systems of British writers and teachers.

Dr. Denman's remarks upon the propriety of the operation, as to morals, are so conclusive, that I may be excused if I quote them: "With regard to the morality of the practice, the principle being commendable—that of making an effort to preserve the life of a child, which must otherwise be lost, and nothing being done in the operation which would be injurious or dangerous to the mother, but on the contrary, a probability of lessening both her danger and suffering—I apprehend, if there be a reasonable prospect of success, no argument can be adduced against it, which will not apply with equal force against any kind of assistance at the time of parturition; against inoculation, or medicine in general; and in fact, against the interposition of human reason and faculties in all the affairs of life."

467. In France, however, the proposed operation was by no means so frankly received or so readily adopted. Certain doctrines of the national church, or at least the interpretation of them by the Doctors of the Sorbonne, touching the importance of fœtal life, seem to have aggravated the risk of the operation, and to have deterred professional men from making the attempt. The great name and extended influence of Baudelocque were opposed to what he considered (in the case supposed) a crime; and a celebrated teacher of the present day, Capuron, has stigmatised it as "*un attentat commis envers les lois divines et humaines.*" Even so late as 1827, on the occasion of a memoir presented by M. Coste, demanding if it would be allowable to bring on labour prematurely in females labouring under aneurism of the heart, the Académie Royale de Médecine pronounced the question "*inconvénient et presque immorale.*" It is said, however, by M. Sue, that M. Petit ranged himself on the side of the advocates of the operation, and since then it has been recommended and practised by Stolz, Ferniot, Paul Dubois, Dezeimeris, Burckhardt, Velpeau, Figueira, Coste, &c.

The objections of the French authors may be thus summed up:—

1. It is immoral.
2. It is almost impossible to determine the exact relations between the head of the child and the pelvis.
3. The manœuvres necessary for exciting labour are highly dangerous.
4. The uncertainty of all women as to the period of their pregnancy.

* Introduction to Midwifery, p. 318, 7th ed. For more minute details and references about these operations I beg to refer the reader to my "Researches on Operatic Midwifery."

5. The difficulty of dilatation of the os uteri at the seventh month.
6. The danger of subsequent disease.

Each of these objections will be answered as we proceed.

It is quite evident, as M. Marinus observes, that these writers had in view the "accouchement forcé," performed at the seventh or eighth month —a different operation, and one perfectly unjustifiable at so early a period.

468. It has been recommended and practised in Germany by Weidmann, Mai, Siebold (four times), Schilling (once), D'Outrepont (twice), Riecke (twice), Haase (twice), Falco (three times), Vezin (three times), Mende (four times), Betschler, Froriep, Wenzel, Spiering, Ritgen (thirty times), Carus (twice), Kluge (twenty times), Reisinger, Busch, Naegelé (once), Seulen (once), Neumann (once), Spoendli (once), Hayn (once), Mampe (five times), Rosshirt, Kilian (three times), &c. &c.; but opposed by Stein, Osiander, sen., Bernstein, Ebermaier, Gumprecht, Piringer, Joerg, &c.

In Italy it seems to have met with less opposition; or at any rate less aversion has been expressed. Successful cases have been published by MM. Ferrario, Billi, Lovati, Bongoianni, &c. &c.

Paul Scheel, in Denmark, Solomon de Leyden and Professor Vrolik in Holland, and M. Marinus, in Belgium, have each advocated the practice.

469. So much for the history of this operation, and the difficulties attendant upon its introduction into practice.

As to the origin of it, all writers are agreed in attributing it to the following circumstances: It has not unfrequently happened that the life of a seven or eight months' child has been preserved by accidental premature labour, in cases where the birth of a child at the full term had been previously found impossible from pelvic distortion.

From the complete success of such cases, as regards both mother and child, it was inferred that premature labour, artificially induced, might in certain cases of pelvic deformity, be employed to supersede an operation (craniotomy) which involved not only the destruction of the child, but considerable risk to the mother. The proposal was not, it must be remembered, to deliver the fœtus artificially, but merely as was stated by Ritgen, "to communicate a slight but certain impulse," by virtue of which the process of parturition may be carried on and completed by the natural powers.

470. The reasoning of Dr. Denman appears to me conclusive, as to the "moral rectitude" of the operation; the next question, therefore, is as to its *safety* to the child and the mother, confining ourselves for a moment to the consideration of the cases originally proposed to be benefited by the operation.

It is perfectly established that a fœtus is "*viable*" at the completion of seven months of utero-gestation, and many instances are on record of children born at that period living to a good old age. M. Chaussier (of Dijon) and his wife were both seven months' children; his majesty George III. was also a seven months' child; and M. Foderè relates the case of the wife of a judge, whose pregnancies always terminated at the seventh month. Examples of "viable" infants born at an earlier period, are likewise to be found; but I beg to refer to the able work of my friend Dr. Montgomery for further details; concluding from all the evidence we possess of the viability of seven months' children, that premature labour, accidentally or artificially induced, at the completion of the seventh month,

does not involve much danger to the child from the immaturity of its growth merely.

As to the actual risk of labour to the fœtus, as ascertained by an estimate of facts, I may adduce the following testimony:

Of twelve cases mentioned by Denman, the majority of the children were saved.

Mr. Barlow reports seventeen cases — six children were still-born, five died a few hours after birth, and six lived.

Of Dr. S. Merriman's ten cases, four children were saved.

Dr. Merriman, jun., mentions forty-six cases — sixteen children lived, and all the mothers recovered.

Dr. Conquest says, that out of nearly one hundred cases, about half the children were born alive.

In Mr. Gregory's case, the child was born alive, but died subsequently.

In Dr. Collins' case, the child lived.

In Mr. Corry's and Dr. Paterson's cases, the infants were saved.

Dr. Hamilton states that "previous to the 26th of January 1836, the author brought on premature labour in twenty-one individuals, on account of defective apertures, viz., in fourteen, once; in one, twice; in three, thrice; in two, four times; and in one, ten times. Of the forty-five infants thus prematurely brought into the world, forty-one were born alive. The death of the four still-born can be readily accounted for." "In the practice of Mr. Moir, and Dr. John Moir, premature labour was induced twelve times on six women. Nine of the infants were born alive, and the cause of the death of the three still-born infants could not be attributed to the operation."

Of Dr. F. Ramsbotham's sixty-two cases, thirty-three children were born alive, and twenty-three lived for a considerable time.

Dr. Lee saved twelve children in thirty-one cases; in several of which, the crotchet was necessary after labour had been induced.

The child lived in Mr. Heane's and M. Spoendli's cases.

M. Ferrario saved five children out of six; M. Klugè nine out of twelve; M. Solomon thirty-four out of sixty-seven; M. Burckhardt thirty-five out of fifty-two; M. Siebold two out of three; M. Mampe four out of five, the fifth being a shoulder presentation.

Dr. Shippan, in his Inaugural Thesis, presented to the medical faculty at Wurtzburg in 1831, has given a summary of ninety cases; seventy-three children were born alive, but eighteen of them died subsequently.

According to MM. Velpeau and Kilian, one hundred and fifteen children were saved out of one hundred and sixty-one cases.

M. Figueira has collected two hundred and eighty cases from different sources, in which one hundred and sixty-six children were saved.

We may conclude from these different data, that more than half the children were saved, notwithstanding a cause of failure to which I have not yet referred. I allude to the greater frequency of mal-presentations in premature labour, than in labour at the full time. In Dr. S. Merriman's cases, for example, there were eighteen mal-presentations out of the forty-six, only one of which was saved. If we could subtract all the cases of mal-presentations, we should find, I doubt not, that the proportion of children lost to those saved by the operation was very much smaller.

471. There is unquestionably *some risk* incurred by the mother, but not more than by an accidental premature labour. After much consideration, Denman concludes that "it is perfectly safe to the person on whom it is performed."

We have already seen that Dr. Kelly performed it three times successfully on one person.

Dr. S. Merriman seems to think that its safety was rather overrated, but he adds, "at all events, the method in question, if carefully conducted, cannot be more hazardous to the mother, perhaps is much less so, than the operation for lessening the head of the fœtus in utero, and it is incomparably less perilous than the Cæsarian operation, or the division of the symphysis pubis." Out of his forty-six cases, not one proved fatal!

Dr. Hamilton observes, "the late Dr. Merriman first called in question the safety of the operation; but the cases on which he formed his doubts on this point, were evidently cases of accidental coincidence, for the safety of the practice is now fully established.

Dr. Blundell concludes his observations by saying, that "with all its faults about it, the practice is of great value, and there are now living in society individuals whose heads have in this manner been preserved from the perforator."

In Mr. Corry's case, the woman recovered rapidly.

Dr. Gregory and Dr. Collins each operated once, with safety to the mothers.

Dr. F. H. Ramsbotham has had recourse to this operation sixty-two times, and it does not appear that the mother suffered in any of them.

Dr. R. Lee lost three mothers out of thirty-one cases.

Mr. Heane saved the mother.

The statistical details given by Velpeau and Figueira, would justify, I think, a much more unqualified commendation. Velpeau states that it has been performed

In Great Britain	72 times.
In Germany	79 "
In Italy	7 "
In Holland	3 "

Making a total of 161 cases, of which number eight mothers died, five of them, however, from causes unconnected with parturition.

M. Figueira has collected two hundred and eighty cases, of which only six mothers died.

M. Solomon operated sixty-seven times, M. Klugè twelve, and M. Ferrario six times successfully.

M. Reisinger lost one patient in fourteen.

All M. Mampe's patients recovered.

MM. Spoendli's and Seulen's patients recovered well.

Of the ninety cases collected by Dr. Shippen, seven mothers died. In three of these the operation was performed once; in two, twice; and in one, three times.

We may therefore conclude, with M. Marinus, that "if these facts be true, it is established that females undergoing this operation incur no immediate danger; and if we push our researches still farther, we shall find that these same females were not attacked by pure lesions of the uterus, as has been advanced; several of them underwent the operation two or

three times, with as much safety as if they had been delivered at the full term of utero-gestation."

Thus the first, third, fifth, and sixth objections made by the French are answered satisfactorily.

472. We have now only to inquire as to the *utility* of the operation, before considering the cases to which it is applicable.

The *positive* utility of the operation has already appeared in the numerical results taken from different authors, showing that more than one-half of the children (all of whom must otherwise have been lost) have been saved, and that but a small proportion of the mothers has been lost.

473. The *comparative* utility is equally in favour of the operation.

It is peculiar to midwifery operations, that they form an ascending series, increasing in gravity from the simplest to the most severe — no two being equal; and therefore, in considering the suitability or practicability of any one, we do so with the knowledge that if the one we prefer do not succeed, we must have recourse to another more severe and more dangerous. An example will make my meaning clear. If, in any given case, we attempt to deliver with the forceps, but are not able to succeed, we must subsequently have recourse to the perforator; there is no other method, of *only equal* severity with the forceps, which we can try. Or again, if craniotomy and evisceration will not render the transit of the child possible, we have no recourse but symphyseotomy or Cæsarean section.

Thus, the *alternative* of any operation in midwifery is not one of *less*, or even of *equal* danger, but *necessarily* one of a *more serious nature*, and consequently we cannot estimate the utility of any obstetric operation fairly, if we consider it by itself; a just appreciation involves a due estimate of its alternatives.

It is to the *alternatives* of the induction of premature labour, that I would wish to call attention, as demonstrating very strikingly the *comparative utility* of the practice.

In the cases which have been supposed to demand this operation, there is always a considerable diminution in the calibre of the pelvis from bony distortion, so that it would be quite useless, at the full term of utero-gestation, to attempt the delivery by the forceps; the only *alternatives*, therefore, if we allow pregnancy to be completed, are, the perforator, symphyseotomy, and the Cæsarean section.

Now let us compare the mortality attendant upon each of these operations with the results of artificial premature labour.

1. By the use of the *perforator*, not only are all the children destroyed, but extensive statistics have shown, that about one in five of the mothers perish, either from the direct effects of the operation, or from the length of the previous labour.

2. *Cæsarean section* is the "*dernier resort*" of midwifery, involving the utmost danger to the mother and child, and justifiable only when no other chance for either remains. I have collected 405 cases; 230 mothers were saved, and 175 lost, or about 1 in $2\frac{1}{3}$. Of 221 children, 156 were saved, and 65 lost, or about 1 in $3\frac{1}{2}$.

3. *Symphyseotomy* is attended with worse results than Cæsarean section. One-third of the mothers have been lost, and many of those who recovered, suffered severely from the consequences of the operation. One-half of the children were lost.

If then to the *absolute* advantages to the operation proposed, be added the *comparative* gain from avoiding these terrible *alternative* operations, we may form a tolerably correct estimate of the *utility* of the "induction of premature labour."

474. Having, as I trust, established from facts and testimony, the three leading principles of the *morality*, *safety*, and *utility* of this operation, I shall now proceed to inquire as to the *cases in which it is available*.

1. The class of cases, for which it was first proposed, and in which it has been most frequently employed, is that in which the diameters of the upper outlet of the pelvis are too much reduced by distortion to permit the passage of a fœtus at the full term, and yet not so much diminished as to prohibit the passage of a fœtus at an earlier but still "*viable*" age. In the words of Denman, "It is under circumstances and in situations preventing the successful use of the vectis or forceps, and just compelling us to the fatal measure of lessening the head of the child, that it may be a duty to propose on a future occasion the bringing on of premature labour."

The first step is to endeavour to ascertain the size of the fœtal head at different periods of utero-gestation, after the seventh month; in order, that by adapting the diameters of the deformed pelvis to the appropriate diameters of the fœtal cranium, we may be enabled to fix upon the moment when they are in correspondence for the induction of premature labour. It is of course impossible to do this in any individual case, but an approximation may be attempted, by taking the measurements in a considerable number of cases at the same periods.

The following table has been thus constructed by M. Figueira.

Age of Fœtus.	Bi-parietal Diameter.	Occipito-frontal Diameter.	Occipito-bregmatic Diameter.
7th Month.	2 inches 9 lines.	3 inches 8 lines.	2 inches 10 lines.
7½ "	3 "	3 " 9 "	3 "
8th "	3 " 1 "	3 " 10 "	3 " 1 "
8½ "	3 " 2 "	4 "	3 " 2 "
9th "	3 " 4 "	4 "	3 " 4 "

475. To this kind of calculation it has been objected, that we cannot be quite sure of the exact age of the fœtuses measured; and to the practical use of it, that the female cannot be quite sure of the exact period of pregnancy. That this objection has a certain weight, must be admitted; but that it is sufficient to prohibit the operation I cannot believe, for it may always be obviated in practice *by assuming the longest possible period of pregnancy*. If, for example, a patient imagine that she is six months pregnant, but that she may be six and a half, by calculating for the six and a half months, we shall have assumed the largest size to which the fœtal head can have attained; and if labour be not brought on till seven months and a half, we shall also have secured a fœtus of the "*viable*" age.

Ritgen has made another series of calculations, which have led to the following practical adaptations:

He says that labour may be induced at the

29th	week,	when	the	antero-posterior	diameter	of the pelvis is	2 inches	7 lines.
30th	"	"	"	"		2 "	8	"
31st	"	"	"	"		2 "	9	"
35th	"	"	"	"		2 "	10	"
36th	"	"	"	"		2 "	11	"
37th	"	"	"	"		3 "	0	"

There is a very slight difference between the tables of Figueira and Ritgen, which may be allowed for in practice. The compression of the fœtal head will also render its diameter less than the subsequent measurement would lead us to suppose.

It will be at once observed that there are two measurements of the pelvis which limit the operation; if the pelvis exceed the greater measurement, the operation is uncalled for; and if less than the least, it will not succeed in saving the child.

The smallest of these diameters appears to be about two and a half inches, and the greater three and a quarter. If the pelvis, in its sacro-pubic diameter, be less than the former, a "*viable*" child will not pass, and it is generally admitted that a living child may be propelled through a pelvis whose antero-posterior diameter is three and a half inches.

The opinions of different authors accord pretty accurately with this calculation.

476. Another difficulty still remains, which has been put forward as a very serious objection by the opponents of this operation; and this is, the uncertainty of ascertaining the exact diameter of the pelvis in the living subject. Various mechanical contrivances have been proposed by Aitken, Coutouly, Baudelocque, Asdrubali, Chaussier, and others (of which I have spoken in a former part of this work); but in this country they could rarely if ever be employed. Nor do I think them necessary; a well-practised finger is, after all, the best pelvimeter, and will yield sufficiently accurate information. But giving the utmost force to this objection, to what does it amount? As Velpeau justly observes: "If the pelvis be wider than we thought, premature delivery (at or after the seventh month) is accomplished without risk. If, on the contrary, the narrowing be more considerable, the fœtus will certainly perish; but then, had no operation been attempted until the full term, the fœtus would equally have been lost, and the mother would have run greater risk."

Besides, much information may be derived from the history of the previous labours of the patient, for it is rarely if ever for the first child that the induction of premature labour is proposed.

Dr. Merriman remarks, "that the use of the perforator in a former labour, is not *alone* to be considered as a justification of this operation." This is undoubtedly true in the present uncertain state of opinion, concerning the use of the forceps and crotchet, inasmuch as the latter instrument is frequently used where there is no distortion.

But if we are convinced that the perforator was used, from the impossibility of otherwise delivering the patient, it might then be an adequate reason; and if it further appeared that her labour had been thus terminated more than once, and for the same reason, the operation would then seem to be imperatively required.

I have now answered all the six objections put forward by the French, as fairly and completely as our facts permit.

477. 2. *A narrowing of the transverse diameter of the lower outlet*, as it offers a fixed impediment to parturition, may be an equally valid ground for the induction of premature labour.

478. 3. *Exostosis, or fibrous tumours of the pelvis*, if they offer an impediment to the delivery of a child at term, or at the earliest viable age; as they are solid and cannot be removed by any operation, will evidently justify the induction of premature labour, or abortion, for the purpose of avoiding the Cæsarean section.

Some of the cases related by Dr. Merriman would appear to confirm this conclusion, and the authority of Dr. Ashwell and his practice are in favour of it.

Mr. Ingleby concludes that "premature labour may with great propriety be proposed on pregnancy recurring, assuming the delivery of a living child at term to have already proved impracticable, the tumour to remain unchanged, and its excision not deemed expedient."

479. 4. When the *uterus* is the seat of *fibrous tumours*, and impregnation takes place, certain morbid changes occur, involving danger to the mother. "The tumours soften during the latter months; the increased vascular supply leads to inflammation; unhealthy and imperfect suppuration is established in them, and death occurs soon after parturition." This being the experience of Dr. Ashwell, he has proposed "the induction of premature labour *before that period when the tumours shall be subjected to pressure and contusion, from the firm, large, and unyielding gravid uterus*."

Before we act upon this suggestion, however, we must be pretty certain that such pressure is likely to take place, and that the case really demands so serious a remedy. Mr. Ingleby has some valuable observations on this subject.

480. 5. In the cases I have supposed, the safety of the child is the great object of the operation; and they are limited, therefore, to those patients in whom the pelvis, though deformed, is still large enough to permit the passage of a "*viable*" child. But there are cases where *the distortion is so great as to render the passage of a seven months' child impossible*, and others still worse, where *no reduction of the child's bulk will enable it to pass.*

I do not see why abortion should not be induced at an early period in such cases. The life of the child must inevitably be sacrificed, and the safety of the mother alone regarded; and surely, after the calculations I have adduced, it cannot be pretended that Cæsarean section, the *alternative* in these cases, offers such a chance to the mother and child as would justify our preferring it.

"When the pelvis is known to be distorted," says Dr. Aitken, "so as to render the birth of a living child impossible, is it not lawful and proper, to prevent the dangers of embryotomy, to induce early abortion?"

An objection to this extension of the operation has been made by Dr. Merriman and others, on the score that it would be "opening a wide door to the dreadful abuse of the operation." That, in short, by multiplying the examples of inducing premature labour or abortion, we should run the risk of its being performed unnecessarily or for wicked purposes. But so may the fact of its being performed at all, and so may the practice of using ergot of rye for the purpose of exciting uterine contractions. I do

not, in truth, see much force in this objection, nor do I anticipate any such prostitution of their power on the part of the members of our profession; and beyond the profession, the operation is not likely to be much known. It will of course be necessary that the case be thoroughly investigated by more than one person, and the time appropriately chosen.

Mr. Radford, of Manchester, has suggested that by combining craniotomy with the induction of premature labour, in those cases where we are called too late for the fœtus to pass even at an early period, we may avoid the Cæsarean operation.

481. 6. In certain cases of *rupture of the uterus*, the cause is almost entirely mechanical. There is some narrowing of the upper outlet, perhaps a projection of the promontory of the sacrum, offering an obstacle to the ready descent of the fœtal head, which is driven forward with great force by the uterine contractions. Under such circumstances, the head may be pushed to one side; and if the tissue be not very firm, it will be driven through them into the cavity of the peritoneum. Recovery from such an accident is very rare, but nevertheless it has occurred: and if the woman become pregnant subsequently, a premature delivery may save both mother and child.

As the best argument I can employ in favour of this operation in such cases, I may mention that it was adopted successfully by Dr. Collins, when Master of the Great Britain Street Lying-in Hospital. The patient had recovered from rupture of the uterus, and became again pregnant. She was admitted into the hospital in the seventh month of pregnancy, and the membranes were ruptured on the 4th of March 1832. Labour came on on the 7th, and was completed in ten hours. The patient was delivered of a living child, and recovered. The child, however, lived but two days. The case is perfectly illustrative of the advantages which may be derived from the operation in this class of cases. The mother was saved, and the child at birth appeared likely to live; its death does not seem to have resulted either from its early age or from the labour.*

482. 7. Dr. Denman observes, "There is another situation in which I have proposed and tried with success, the method of bringing on premature labour. Some women who readily conceive, proceed regularly in their pregnancy till they approach their full period, when, without any apparently adequate cause, they have been repeatedly seized with rigors, and the child has instantly died, though it may not have been expelled for some weeks afterwards. In two cases of this kind I have proposed to bring on premature labour when I was certain the child was living, and have succeeded in preserving the children without hazard to the mothers. There is always something of doubt in these cases, whether the child might not have been preserved without the operation; but as such cases often come under consideration, and as I am disclosing all that my experience has taught me, it seemed necessary to mention this circumstance." Mr. Barlow thinks the "doubt" expressed in the above extract, a sufficient ground for negativing the operation.

483. 8. The question has been mooted, whether it would be right to induce premature labour on account of the presence of *certain diseases caused by or connected with pregnancy*. Denman remarks: "The pro-

* The patient was afterwards delivered naturally at the full time. The details of the case will be found in Dr. Collins' "Practical Midwifery," p. 255.

priety of this practice has also been considered when women have, during pregnancy, suffered more than common degrees of irritation, and especially when the stomach is in such a state that it cannot bear nourishment of any kind or in any quantity, and the patients are thereby reduced to a state of dangerous weakness. Presuming that these symptoms are purely in consequence of pregnancy, it may, perhaps, be justifiable to bring on premature labour."

Dr. Merriman relates a case occurring in the practice of a "provincial surgeon of considerable eminence." "The patient was teased with a very severe cough, and her stomach was so irritable as to retain no food whatsoever, nor even opium in a solid form. She had taken absorbents, stomachics, bitters, aromatics, and opiates, without experiencing any relief: liniments, fomentations, and blisters, had been extensively applied without benefit, and she was thought to be sinking into her grave, when it was proposed, as a last resource, to bring on premature labour, six weeks before the full time, and the patient was delivered of a living child, and ultimately recovered."

A case of fatal vomiting, during pregnancy, is related by Dr. Johnson in the Lancet, March 3, 1838, p. 825. "A lady, thirty years of age, soon after marriage ceased to menstruate, and became affected with morning sickness, which symptoms were naturally enough attributed to pregnancy. The sickness, however, gradually became worse, and at last nothing of any kind could be retained on the stomach. Pregnancy was not detected, but the disorder attributed to some disease of the pylorus. The sickness and extreme emaciation were the only symptoms present. After death no morbid appearances were observable in any part of the body. The uterus contained a fœtus about four months old. This patient was literally starved to death." "The treatment pursued consisted in the use of various salines, anti-emetics, counter-irritation, leeches, acetate of morphia sprinkled over a blistered surface," &c.

Surely the induction of premature labour in this case would have been justifiable, as affording the mother a chance of recovery.

Other similar cases are on record, both of fatal vomiting, and of success by means of premature labour; and recently a case occurred to myself, in consultation with Dr. Maguire, of Chapelizod. The patient was a young woman, pregnant of her third child, and at about four months was attacked with incessant vomiting, until her life was rendered intolerable, and her strength utterly exhausted. I never saw such agony in any case. We tried all the usual remedies with occasional relief, but the vomiting returned, and finding that she could obtain no nourishment whatever, that her bodily powers were worn out, that her pulse was steadily 120, I determined, at the sixth month, to induce premature labour, which I effected by puncturing the membranes and giving ergot of rye. She was delivered of a dead fœtus, recovered rapidly, and has since borne a child at the full time.

It sometimes happens, that the *serous effusion* which is usually confined to the lower extremities of pregnant females, is extended to the cavities of the pleura and peritoneum, and as it thus gives rise to a train of severe and perhaps dangerous symptoms, the induction of premature labour may be advisable in some cases, and has been practised by Siebold and Carus.

Puzos induced premature labour in a case of *strangulated hernia*, to facilitate the operation, and afford a better chance to the child. He saved the child, but the mother died afterwards.

On this part of the question, I confess it appears to me almost impossible to lay down definite, and general rules; the decision must rest with the judgment of the medical attendants in each individual case.

484. 9. The only exception made by Baudelocque to his condemnation of artificial premature labour, is in those cases of great uterine hemorrhage, before the completion of the term of utero-gestation, when the child is probably destroyed, and the safety of the mother compromised.

These are all the circumstances which have ever been considered to justify our interference in the manner proposed.

485. *Mode of operating.*—Six methods of exciting uterine contractions have been adopted and recommended by different practitioners.

1. Abdominal frictions, and manipulation, with warm baths, &c., have been advised, but they very rarely succeed, their supposed advantage being the absence of unnecessary irritation.

2. Separating the membranes for two or three inches around the os uteri, will frequently bring on labour; and as this is the closest imitation of natural labour, it has been preferred by many. Dr. Hamilton remarks, "that he is now convinced, from the experience of the last ten years, that if there be a sufficient portion of the decidua separated from the cervix uteri, there is no occasion for the introduction of the open male catheter," *i. e.* for puncturing the membranes. Dr. Conquest considers it as effectual as the other methods, and much safer for the infant, as saving it from pressure during the pains. If it fail, we can still have recourse to the third plan.

3. The membranes may be ruptured, either directly or obliquely. For this purpose Wenzel, Ritgen, Klugè, and others, have invented appropriate instruments; but a female catheter may be used, or a piece of wire, or a canula having concealed within it a spring trocar. Care must be taken to wound neither the mother nor child.

This plan was adopted in Mampe's and Spoendli's cases; in 36 of Dr. F. H. Ramsbotham's — (of these, 21 children were born alive, and 19 ultimately lived); and from its greater certainty, it has been preferred by most practitioners.

4. MM. Brünninghausen and Klugè have proposed and practised, with great success, the dilatation of the os uteri, by means of a piece of sponge placed within it, and maintained there by a plug in the vagina. Velpeau's experience of the value of these different plans is thus expressed: "The two latter methods are chiefly practised. By the third, the effect is not always produced; it required three operations in the case related by M. Riecke. The separation of the membranes (the second method) is not sufficient to bring on uterine contractions; as the distension of the cervix is not permanent, the first attempt is rarely successful. Distension, by means of a piece of sponge, as proposed by M. Klugè, is much more certain. The irritation which results is permanent, progressive, regular, and sustained by the plug, which is maintained in the vagina. Under the influence of such an excitement, uterine action is soon brought on, and it rarely fails to acquire sufficient energy."

Hayn, of Königsberg, to whose case I have referred, adopted this plan with success; but other authors do not agree with Velpeau in thinking it more certain than rupturing the membranes.

5. Ergot of rye is now generally believed to have the power of originating uterine contraction, and if this be the case, it will probably be found to be the most effectual and safe mode of inducing premature labour, because we can preserve to the child the safeguard of the liquor amnii, which is of the greatest importance.

Dr. F. H. Ramsbotham has mentioned many cases in which it was tried for this purpose. Labour was brought on by its use alone, at the seventh or eighth month, in twenty-six cases, without interfering with the membranes of the os uteri. All the mothers recovered, and 12 of the children were born alive, and 14 still-born. Of the 12 born alive, 4 only survived for any length of time.

Dr. Paterson, of Glasgow, and Mr. Heane, of Gloucester, succeeded by this means.

Mr. Corry and Dr. Lee tried it, but failed.

Although the medicine appears successful as regards the induction of labour and the consequences to the mother, yet the proportion of children lost is greater than by the other methods; and this must be a serious objection to its use, when the pelvis will admit the passage of a viable child.

6. Galvanism, which Dr. Radford believes to have the power of originating uterine action. It is certainly worth a trial, but as yet we have little evidence of its utility.

It has been suggested, that the application of the extract of belladonna might aid in the dilatation of the os uteri; but independent of the fact being doubtful, the practice would be dangerous, in consequence of the active absorption and the development of the poisonous effects of the medicine.

486. An interval, varying from twenty-four to ninety-six hours, generally elapses after the operation, before uterine action commences, which it does sometimes by shivering and feverishness. "Great disturbance in the nervous system," says Dr. Gooch, "is produced by it; severe rigors, rapid pulse, and delirium, are the occasional consequences; but these symptoms, proceeding from nervous irritation, do not continue long enough to produce any serious consequences." In many cases these symptoms are altogether absent. The patient will require the same management as after ordinary labour. It will be advisable to have a nurse in readiness, to supply the infant with its natural nourishment, until the mother shall have milk for it.

487. This is probably the best place for me to introduce some notice of the employment of anæsthetics in midwifery, for even those who object to their use in natural labour, admit their great value in operative midwifery.

The two sole agents in use now for the purpose of producing insensibility to pain, are ether and chloroform, but the latter has so far superseded the former, that I may confine my remarks to the use of chloroform.

To my friend, Professor Simpson, belongs the credit of having been the first to administer ether during labour, and also of having discovered the

value of chloroform as an anæsthetic, and of introducing it into practice. It is composed of two atoms of carbon, one of hydrogen, and three of chlorine, or one of formyle and three of chlorine, sp. gr. 1·480: it rapidly evaporates, and possesses an aromatic, pungent taste, and a fragrant smell.

When inhaled, it gives rise to exceedingly pleasant sensations, and a rapid flow of thoughts and images, resembling a pleasing dream, until, as the dose is increased, these become confused and incoherent, previous to deep sleep being induced. The first stage is one of excitement, then follows calm sleep, and at length stupor; but the excitement is said to be less than when ether is used.

The beneficial effect is the alleviation of pain, in consequence of and in proportion to the amount of insensibility, so that we possess the power of graduating its effects as we may deem advisable.

That injurious effects are occasionally produced, is no more than we should expect from so powerful an agent: that they have occurred in so very small a proportion, may well excite our wonder. Almost all the unpleasant symptoms are referable to the nervous system, such as spasms, twitchings, hysterics, convulsive movements, convulsions, incoherent talking, &c. Several fatal cases of collapse have been recorded, and although some doubts have been entertained as to whether the death was caused by the chloroform, I fear the evidence is too clear. It is remarkable that in most of these cases, I believe, the chloroform was administered, not to relieve pain, but in anticipation of it, as for tooth-drawing, &c. It is of importance to remember that the pulse is a very accurate indicator of the propriety of continuing the inhalation; we should stop instantly, if we find it becoming weak.

488. So much for the general use of chloroform; now let us see what has been the result of its employment in midwifery. It has been now used extensively in Great Britain, in America, and on the Continent, and we have an account of at least 3000 cases in which it has been employed. From this it appears

1. That in midwifery practice, no death has occurred which can be fairly and directly attributed to the chloroform. In the cases brought forward by Mr. Gream there is no evidence to prove that the deaths did not result from the circumstances of the labour, and abundant proof of a disposition to attribute every accident to this new agent.

2. That some unpleasant symptoms have occurred in hysterical and nervous women during the stage of excitement, but no instance of the alarming or even fatal collapse which has taken place in cases unconnected with pregnancy or parturition. These symptoms disappear in a few moments if the chloroform be discontinued, or, as is said, if the dose be increased.

3. In a small proportion of cases, the uterine contractions are weakened, rendered less frequent, or even suspended, so long as inhalation is continued, but they return if the use of chloroform be discontinued.

4. In the great majority of cases, it does not interfere with the labour pains, except by suspending all voluntary exertions if the insensibility be complete. Where the dose given is milder, although great relief be

afforded, the patient will not become insensible, and will be able to exert considerable force.

5. That chloroform, in full doses, is capable of entirely removing the pain of obstetrical operations, and thereby increasing the facility of their performance. Moreover, that the dose can be so graduated as to afford degrees of relief, so that, in natural labour, a certain amount of suffering may be spared without producing insensibility or incurring the risk, whatever that be, of a full dose.

6. It neither prevents nor weakens the subsequent contractions of the uterus, and consequently does not render the patient more liable to flooding.

7. That certain women seem more obnoxious to its injurious effects than others, and in some these effects are said to continue some time. Giving full force to these cases, they appear to form a small part of a large number whose recovery was not retarded, and whose subsequent health was uninjured.

These inferences, I think, are fairly deducible from the published cases: whether, as has been asserted, many fatal or bad cases have occurred which have not been recorded I cannot say, but until we know the particulars, it is clear that we can allow no weight to such a supposition. It is much to be regretted that so much personal and party feeling has entered into the publications on the subject, instead of a simple desire to discover in what cases this new agent is admissible, and in what it ought to be rejected, with the reasons for such decision.

489. It is right, however, to notice respectfully some of the objections which have been made by most experienced and conscientious practitioners.

1. The first objection I shall notice is, that as "in sorrow shalt thou bring forth children" was part of the original curse pronounced upon the sin of man, therefore any attempt to mitigate the suffering is a direct and unwarrantable interference with an ordinance of God. Now it will be remembered that labour ("in the sweat of thy brow"), pain, and death were equally the result of the same sin, and inflicted by the same Hand, and yet we never hear of the wickedness of lightening labour, of relieving pain, or of postponing death, each of which *must* be wrong, if relieving the suffering of childbirth be wrong. It is monstrous that one sex should claim the privilege of relief and object to its being extended to the other. If further argument be needed, the reader may refer to Dr. Simpson's critical remarks upon the Hebrew word translated "labour."

2. It has been stated that in operations, the loss of sensibility deprives the operator of a valuable indication as to whether he is inflicting injury or not. I do not see much force in this objection, I confess. If the operator be skilful and habituated to the use of instruments, he will not do mischief because the patient does not cry out; and if he be not skilful, her crying out will not prevent him. I am sure that the patient being spared the shocking pain of most operations, and the operator the distress of witnessing it, is a blessing beyond price, and more than anything calculated to secure a safe and skilful performance, and in all probability a favourable convalescence.

3. Our ignorance of the bad consequences of chloroform, and of the

cases improper for its exhibition, and the consequent probability of our complicating the labour by some serious accident voluntarily incurred, has been, and is yet, I think, an objection deserving of careful consideration. No doubt, the increased and increasing number of facts recorded affords a ground for sound conclusions, in proportion to their extent; but it is still to be desired that there should be a careful classification, and minute investigation of those cases in which any unpleasant symptoms have occurred, with the object of discovering the circumstances, whatever they may be, which counter-indicate the employment of anæsthetic agents. Interruption of uterine action, diminution of uterine force, and affections of the nervous system, seem to be the chief evil effects to be feared in parturient women.

4. The probability of uterine hemorrhage after labour was formerly much insisted upon, but I think experience has shown that this fear is groundless. It has not occurred more frequently in patients who have used chloroform than in others.

490. Thus far I have given the inferences which appear to me to be fairly deducible from the cases on record, irrespective of the opinions of the various writers who have engaged in the controversy. The following practical conclusions may be regarded as my own opinion, formed after much thought and reading, and after some slight personal experience. I would not wish to put them forth dogmatically, for I do believe that we are not yet in a condition to define accurately, or to speak positively on the subject. I confess that I can neither agree with those who think that chloroform can do no evil, and therefore ought to be used in every case, nor yet with those who regard it as in all cases injurious, and therefore to be reprobated.

1. In most *obstetric operations*, anæsthesia appears to me to be of great use, not so much because it is supposed to relax the soft parts, or to moderate uterine action, as because it enables the patient to bear the additional pain we inflict without outcry or movement. It surely must be a great advantage in performing a dangerous operation that the patient should lie still, and not by her struggles increase our difficulty, and the risk of injury to herself. If the tissues be relaxed, which is doubtful in many cases, it is of course an additional advantage; and if it happened in a case of turning that the uterine action were suspended, of course the operation would be all the more easily completed; but these are rather accidental advantages than essential consequences. In operative midwifery, therefore, chloroform may be given until anæsthesia is produced, before commencing, and its effects may be kept up during the operation *provided* that there be no counter indication to its use, and that no unpleasant symptoms arise; in either case it should be given up altogether. In any operation for terminating labour in a case of convulsions, I should be unwilling to use chloroform on account of the nervous excitement it occasionally produces, notwithstanding that it is said to have been employed beneficially in the treatment of that disease: in like manner I should fear to use it in cases of alarming hemorrhage, lest it should give rise to severe collapse. I mention these cases as illustrative of the caution which appear to me necessary in the present state of our knowledge. Further experience may prove this reserve to be unnecessary, or may confirm its propriety.

2. As to its exhibition in *natural labour:* as I do not believe that in the large majority of cases, convalescence is at all impeded by the suffering, I cannot see the *necessity*, or even the propriety of urging the employment of anæsthesia in every case; and I do feel that even greater caution ought to be used than in operative midwifery. We may be justified in running some risk where an important point is to be gained, such as perfect quietness during an operation, which we should not be justified in incurring merely to relieve pain. Thus in hysterical or nervous patients, in those labouring under nervous affections, or organic disease of the lungs or heart, &c., I do not think we ought to employ it.

But on the other hand, as pain is undoubtedly an evil in itself, if there be no counter indication, and if the suffering be either great or prolonged, I cannot see that we are prohibited from the employment of anæsthetics, more especially as it is not necessary in such cases to produce insensibility. It is quite possible to afford immense relief, to "render the pains quite bearable," as a patient of mine observed, by a dose which does not produce sleep or impair the mental condition of the patient, and which all our experience would show is absolutely free from danger.

In my own practice I have never urged a patient to use chloroform in natural labour, and, on the other hand, I have not felt justified in refusing a moderate dose of it when the patient urgently desired it, and none of the conditions were present which seemed to me to counter-indicate it.

491. The period at which it has been administered varies with different practitioners; some commence before the os uteri is dilated, others about the time the head escapes through it. There can seldom be any necessity for its use, I think, before the os uteri is fully dilatable, and it is more likely to interfere with the uterine action at an early than a later period. At the commencement of the second stage would, I should think, be soon enough, and this seems to be Dr. Simpson's practice.

492. There is a difference of opinion as to the extent to which the anæsthesia should by carried. Prof. Simpson prefers inducing complete insensibility at first, and then keeping up just so much of the effect as he deems advisable. Dr. Rigby prefers commencing with smaller doses in natural labour, and increasing them if necessary; and the Obstetric Committee of the American Med. Association, in their Report, agree with this view. Of course, if we are to operate, the patient should be placed thoroughly under the influence of chloroform before we commence, and its effects kept up by occasional inhalation. But in ordinary cases, as I have said, I prefer beginning with a moderate dose and watching its effects, and if necessary, increasing the anæsthesia.

The dose should be administered at the beginning of each pain, and increased when the head is passing over the perineum. The anæsthetic state may be kept up for hours without mischief, especially when complete insensibility is not required.

I have tried various modes of administration, instruments specially contrived for the purpose, sponge, lint, &c., and I believe that by far the best is the one originally proposed by Dr. Simpson, viz. a clean white pocket handkerchief folded funnel-shape; into which half a drachm or a drachm of chloroform is to be poured, and which may then be first placed near the mouth of the patient, and after a few respirations, over both mouth and nose. It is a good plan to allow the patient to hold the hand-

kerchief herself, unless we wish to produce deep anæsthesia, as it will fall from her hand when sleep commences.*

* The employment of anæsthesia in all cases of labour, as a matter of routine, merely for the purpose of securing to the parturient female freedom from pain, has, it is believed, at present few advocates, but the number of those who are in favour of the practice in certain forms of difficult and instrumental labour is evidently augmenting.

It must be admitted, that, in a very large number of cases of natural labour, anæsthesia has been induced without, apparently, any evil consequences accruing to either mother or child — whether all the instances in which injury has resulted from the practice have been made public we have no means of judging. That we should have heard of so few is really a matter of surprise, considering the powerful influence the several anæsthetic agents must exert upon the nervous system, and the extensive and careless manner in which they have too often been resorted to.

It is true that, in the practice of midwifery, anæsthesia has seldom been carried to the extent of producing entire unconsciousness, and even when inordinate doses of ether or chloroform have been administered, the patient has been probably saved from the fatal consequences of the accoucheur's rashness, by his careless manner of using the agent, causing the greater portion of it to escape into the air of the chamber instead of passing into her lungs.

The time is rapidly approaching when, from a full and honest comparison of facts, the question as to the propriety of employing anæsthesia in obstetric practice will be definitely settled, and the cases and the period of labour, and the extent in which it may be safely and beneficially resorted to, become fixed upon certain and well-established data. Already the ultraism of the early partisans of the practice is rapidly abating, while many of those who at first objected to it, as under all circumstances dangerous, if not positively injurious, are willing to avail themselves of its aid in certain forms of labour. — EDITOR.

CHAPTER X.

OBSTETRIC OPERATIONS. 2. VERSION OR TURNING.

493. The term *version*, or *turning*, is applied by midwifery teachers generally, to that manual operation by which one presentation is substituted for another, less favourable; and in a more limited sense, to the rectification of certain malpositions.

For the furthering of one or other of these purposes, it has been known to the profession for a considerable period; but the full benefit of the operation, and the class of cases in which it is useful, is of much later discovery. It is recommended by Hippocrates, Celsus, P. Æginetus, Rhodion, &c.; by the early English authors, as Raynalde, Pechey, &c.; among the French by Ambrose Parè, Guillemeau, Portal, &c.

494. Statistics:—

Date.	Author.	Hospital, &c.	Cases of Version.	Total No. of Cases.	References.
1781	Dr. Bland,	Westminster Dispensary,	9	1,897	Merriman's Synopsis.
	Dr. Jos. Clarke,	Dublin Lying-in-Hospital,	48	10,387	Trans. of Assoc. vol. i.
	Dr. Merriman,	London, Private Practice,	14	2,947	Synopsis, 4th edition, p. 335.
1816	Dr. Granville,	Westminster Dispensary,	8	640	Report of, p. 25.
1826 to 1833	Dr. Collins,	Dublin Lying-in-Hospital,	33	16,414	Prac. Treat. on Med. p. 73.
1828	Dr. Cusack,	Wellesley Dispensary,	5	313	Dublin Hospital Report, vol. v. p. 495.
1832	Dr. Maunsell,	Do.	2	442	Edin. Jour. No. 117.
1833		Do.	0	416	Dub. Jour. vol. v. p. 367.
1828	Mr. Gregory,	Coombe Hospital,	3	691	Dublin Hospital Report, vol. v.
1834 to 1837	Dr. T. Beatty,	Cumberland Street Hospital,	6	1,182	Dublin Jour. vol. viii. p. 66, vol. xii. p. 273.
	Dr. Reid,		20	3,250	Midwifery.
1836 1837 1838	Dr. Churchill,	Western Lying-in-Hospital,	11	1,640	See Reports.
	Mr. Mantell,		8	2,510	Amer. Med. Jour. vol. iv. p. 245.
1848	Drs. M'Clintock and Hardy,	Dublin Lying-in-Hospital,	23	6,634	Prac. Obs. in Midwifery.
	Mad. Lachapelle,	Maison d'Accouch.,	155	15,654	Pratique des Accouch. p. 198.
Dec. 1799 to July 1811	Mad. Boivin,	Maternité,	218	20,357	Mémorial de l'Art, &c. p. 354.

Date.	Author.	Hospital, &c.	Cases of Version.	Total No. of Cases.	References.
1808	M. Ramboux,	Clin. de Liege,	1	216	Bull. de la Faculté, &c. vol. ii. p. 73.
1825 to 1826	Dr. Merrem,	Cologne,	3	157	Do. vol. xvii. p. 283.
1828	M. Papavoine,	St. Louis, Paris,	1	240	Jour. du Progrès de Méd. vol. xiv.
1829	. . . . .	Hôtel Dieu, Paris,	2	280	Velpeau l'Art d'Ac. p. 50.
1830 to 1831	M. Ciniselli,	Clin. de Pavia,	2	94	Gaz. Méd. de Paris, 1835.
1833	M. Mazzoni,		18	481	Prospetto Ragionato, &c.
1789 to 1792 and 1801 to 1806	M. Boer,	Vienna,	51	6,666	Die Natürliche Geburtshülfe, &c. vol. i. pp. 72, 148, 237; vol. iii. pp. 62, 130, 245.
	M. Naegelè,	Heidelberg,	22	1,411	Velpeau's Tab. View.
1801 to 1807	G. M. Richter,	Moscow,	25	2,571	Synop. Prac. Med. Obstetric, p. 416.
	Do.	Private practice,	27	624	
1812 and 1813	E. Von Siebold,	Wurzburg Hospital	6	310	Siebold's Jour. für die Geburtshülfe, &c. vol. i. pp. 114, 576.
from 1818 to 1829	Do.	Berlin Hospital,	60	2,055	Do. vol. iii. to x.
1819 1820	M. Ritgen,	Giessen,	1	180	Do. vol. vi. pp. 34, 262.
1814 to 1824	M. C. G. Carus,	Dresden,	29	2,133	Do. vol. vi.
	M. Killian,	Clin. de Prague,	63	2,350	Bull. de la Faculté, &c. vol. xxv. p. 352.
1824 to 1827	M. Klugè,	La Charité Berlin,	19	1,254	Siebold's Journal, vols. vi. vii.
1825	Prof. Andrée,	Breslau,	5	181	Do. vol. vi. p. 154.
1825 to 1828	Dr. Brunatti,	Dantzic,	3	380	Do. vols. vii. ix.
1825 1826	Dr. Theys,	Trier,	1	49	Do. vols. vii. viii.
1826	Dr. Henne,	Königsberg,	2	156	Do. vol. viii. p. 121.
1826	Dr. Voigtel,	Magdeburg,	1	29	Do. vol. viii. p. 831.
1827	Dr. Küstner,	Breslau,	6	176	Do. vol. ix. p. 92.
1829 to 1832	Dr. Adelmann,	Fulda,	1	166	Do. vols. xi. xiv.
1830 to 1832	Dr. Siebold,	Marburg,	8	321	Do. vols. xi. xii. xiii.
1833 1835 and 1836	Do.	Göttingen,	7	504	Do. vols. xv. xvi.

Thus we see that the records of English practice yield 49,323 cases, and 190 cases of version, or about 1 in 259¾; French practice, 37,479 cases, and 400 cases of version, or about 1 in 93½; and German practice, 21,516 cases, and 337 cases of version, or 1 in 63⅔. The whole number of cases is 108,318, and of version, 927, or about 1 in 116¾.

495. It is not so easy to make out a satisfactory table showing the danger of the operation to the mother and child, from the want of details. Many writers do not mention whether any of the mothers died, and some omit the result as regards the child.

In the following table, I have taken all the numbers upon which I could depend, and though the list is not extensive, I believe that the average mortality will be found pretty correct.

Authors.	Number of Version Cases.	Mother Lost.	Children lost.
Mad. Lachapelle	155	Not stated.	45
Mad. Boivin	218	Not stated.	48
Dr. Clarke	48	6	35
Dr. Collins	33	3	13
Dr. Cusack	5	0	2
Mr. Gregory	3	0	0
Dr. Beatty	6	1	6
Dr. Churchill	11	0	5
Professor Andrée	5	0	3
Dr. Klugè	7	1	3
Dr. Küstner	6	0	2
Dr. Adelmann	1	0	0
Dr. Boer	26	0	10
Dr. Mazzoni	18	0	7
Drs. M'Clintock and Hardy	23	1	5

Thus, in 192 cases, where the result to the mother is specially mentioned, 12 mothers died, or 1 in 16.

I do not give this result as the exact mortality of the *operation*, because it is evident that the deaths in some cases may have been owing to the *cause* which demanded the operation, as in placenta prævia; but as we find that even in several of these cases, the fatal termination was evidently more owing to the operation than to the hemorrhage, I am inclined to think the calculation not very far from the truth. However, any erroneous inference from these statistics, will be guarded against by the recollection of the various and serious accidents which require the operation.

In 565 cases, where the result to the child is detailed, 187 children were lost, or rather less than 1 in 3.

To a certain extent the same observations apply to this calculation of the mortality amongst the infants, and similar allowance must be made.

496. The *object* of the operation is threefold:

1. To place the head in a more favourable relation to the pelvis, or to substitute the head for some other presentation.

2. To substitute the inferior extremities for some other less favourable presentation.

3. To hasten the termination of labour, in consequence of complications, as *convulsions*, *flooding*, *prolapse of the funis*, &c.

It has been proposed to turn and deliver instantly, in case of the sudden death of the mother, instead of having recourse to the Cæsarean section; but the mortality amongst children so delivered would preclude this application of it.

There is so much difference in the means by which the first and second objects are attained, that it is necessary to say a few words upon each.

497. 1. *Version by the head*, or *cephalic version*, as it is termed, consists (*a*) in clearing the upper outlet of any part which may hinder the descent of the head; (*b*) in seizing the head, and bringing it down to the brim of the pelvis; (*c*) or in rectifying the malposition of the head.

As the majority of children enter the world head foremost, this mode was decided to be the standard of natural presentation at a very early period, and attempts were made to correct any deviations. Rhodion, Raynalde, &c., endeavoured to change footling into head presentations, but not by internal manœuvre. After the discovery by Amb. Parè, Guillemeau, and others, of the ease with which labour could be terminated by bringing down the feet, cephalic version went very much out of fashion. By the great bulk of recent writers (especially in our own country) it is either not mentioned at all, or with reprobation. Still there are cases in which its suitability could not be overlooked, and in consequence we find an admission here and there of its utility. Smellie recommends it in certain malpositions of the head; Mauriceau advises it if the neck present; and De la Motte, Melli, and Roux speak of success obtained in this manner. Le Roi preferred it generally to version by the feet.

These, however, were only exceptions to the rule: it remained for Flamant, professor at Strasburgh, to recall the attention of the profession to the operation, in such a way as to procure its re-admission (at least on the Continent) into the number of valuable obstetric operations. His example has been followed by several German and French writers. Labbe, Eckhardt, and Wigand, published successful cases in 1803; Schnaubert in 1815; D'Outrepont and Regnaud in 1825. Busch gave an account in 1826 of fifteen cases, in which fourteen infants were born living. In 1827 Ritgen collected forty-five successful cases. Riecke has had sixteen cases. It has been eulogised by MM. Vallée, De Roche, Ubersaal, Stolz, and Toussaint. Jöerg and some others advise the head to be seized and placed in position when nearest the cervix, and Gardien seems inclined to recommend it strongly, "if practitioners were only as well versed in the use of the forceps as the Professor of Strasburgh."

One of the few British writers who speak well of it, is the distinguished Professor at Glasgow, Dr. Burns, who says: "For instance, if the patient be known usually to have a short labour, if the pains be brisk, the os uteri dilated, or in a relaxed and easily dilatable state, the liquor amnii retained, and the head moveable, then the head may, without any difficulty or much irritation, be placed in the proper position, with a fair and reasonable chance of success."

I may also cite the testimony of Dr. Dewees, who acknowledges that "should nothing but the position of the head, with a slightly diminished capacity in the antero-posterior diameter, affect the labour, we may sometimes enable the woman to deliver herself, provided the waters have discharged themselves, by the aid of two or three fingers within the vagina, and applied to the side of the head, so as to carry the vertex towards one

of the acetabula;"—"when thus placed, we may commit the termination to the natural efforts, provided no other circumstance complicates the labour."

498. It is stated as an *objection* to the employment of this kind of manipulation, that it is more difficult to catch firm hold of the head and to bring it to the upper outlet; that if we succeed in bringing it to the brim we can do no more, but must then leave it to nature or use the forceps. To these and similar objections, Velpeau has returned the following answer: "1st, It is not always very difficult to seize the head, and to exert considerable force upon it; 2dly, if the waters have not been long discharged, one may often without difficulty seize the vertex, and bring it to the centre of the brim, however far it may have been distant; 3dly, that in general it is better to force the head to descend, by pushing up the presenting part, than by bringing down the head; 4thly, that delivering by the breech is far from being a simple and safe operation; as regards the child, it is less so than cephalic version, even if the forceps should afterwards be applied."

No one can for a moment deny that there is considerable weight in the objections I have named; but a more detailed investigation will show that they are valid only against an indiscriminate employment of the operation, and not against its use in the cases to which it ought to be confined. These cases may be divided into two classes: 1, where the pelvis is of sufficient size, and nothing but the *malposition* of the child's head calls for interference; 2, in certain *malpresentations*, such as the neck or shoulder, and perhaps in a few arm cases, if the uterus be not strongly contracted, and especially if the waters have not escaped.

It is evidently not calculated for any case where prompt delivery is necessary.

Its *advantages* are found to be,—first, a greater facility in reaching the head, for it is not proposed to be used in cases where the feet are near the os uteri; and secondly, a vast saving of infantile life. This operation will be no more fatal to the child than natural labour, if performed early, whereas in footling cases and in version by the feet, one in three is lost.

499. 2. *Turning by the feet*, or *podalic version*.—This was known to the ancients, but confined by most of them to the case of dead children. To Ambrose Parè we are indebted for demonstrating its facility and comparative safety, and for inculcating it in practice. His distinguished pupil, Guillemeau, followed in his footsteps, to be himself succeeded by others of brilliant talent and profound research, who cleared up the difficulties, and settled the limits, and laid down the rules for the operation.

The peculiar *advantages* of version by the feet are:

1. That it gives to the operator the entire control over the whole process of the labour, so that he can regulate its duration, either acting with, or independent of, the pains.

2. That though inferior in its results to labour with head presentation, it is about equal to any other, and superior to some.

3. That in some cases it is the only chance of saving the child's life, or of avoiding evisceration.

4. That in certain cases it affords a probability of saving the mother's life, when other means are hopeless.

On the other hand, its *disadvantages* are not to be overlooked; for—

1. From the distance the hand has to traverse, and the difficulty of seizing the feet and of turning the child in utero, there must ever be a fearful risk of injury to the mother.

2. The mortality amongst the infants thus brought into the world is very great; as far as our statistics extend, they yield 187 out of 565 delivered, or about 1 in 3.

500. From all that I have said, it will not be difficult to specify the *cases to which the operation is applicable.*

1. It may be used in all cases of *malpresentation*, whether of the superior extremities or trunk.

2. If upon the introduction of the hand it be found impossible to rectify the *malposition* of the head, we are advised to seek for the feet and bring them down.

3. In all cases of *placenta prævia*, many cases of *ruptured uterus*, *convulsions*, *prolapsed funis*, &c., the operation is available, and has been used with great success.

It is right to mention that Denman and some other writers recommend turning when the pelvis is slightly too narrow for the child's head; but I must confess that this practice appears to me more than questionable.

501. The next point for our investigation is the *period most suitable* for making the attempt; so as not to interfere rashly on the one hand, nor to delay too long on the other, "*neque temerè nec timidè* ——." Of the two errors, it is hardly too much to say, that excessive delay is the more serious.

1. If the case be one requiring *cephalic* version for the rectification of a *malposition*, it is clear that the operation can only be safely, if at all, performed before the uterine efforts have wedged the head into the upper strait; the attempt should be made so soon as it is evident that the natural powers will not rectify the malposition. It will be an additional motive for *prompt* assistance, if we find the pains violent, and that the patient have had many children, lest the head, not being able to enter the brim, should be turned aside, and forced through the uterine or vaginal parietes.

2. (*a*) If we are called to an *arm presentation*, or any demanding *podalic* version, before the escape of the liquor amnii, and we find the *os uteri* hard and undilatable, it will be advisable to wait until some change takes place, before we introduce the hand; neither is there any risk worth mentioning, provided we remain with the patient, to operate instantly when the waters break.

(*b*) If we see the patient before the rupture of the membranes, and find the os uteri soft and dilated or dilatable, there is no reason for deferring the attempt, if the case require this kind of interference, and great advantage in operating while the uterus is distended. If we take it when the os uteri will admit the finger and knuckles, it is the better time, because we then turn the child as if in a bucket of water; and this gives us so clear an advantage that it needs no explanation.

(*c*) If the os uteri be dilatable, the sooner the attempt is made after the escape of the waters the better. Gardien says that the most favourable moment is just when the waters break.

(*d*) After the escape of the waters, we sometimes find the os uteri neither rigid nor much dilated, and the pains moderate. In such cases, no time should be lost; the hand should be introduced into the vagina,

and gentle yet firm and persevering efforts made to pass the hand into the uterus. Dr. Blundell says, "In ordinary cases, if the mouth of the womb be as broad as a crown-piece, and if the softer parts be relaxed thoroughly, the introduction of the hand is not exposed to greater risk than usual; there seem to be no circumstances preclusive of the operation, and the sooner you commence the better."

(*e*) So far, although these cases are each more serious than the other, yet in none of them has any very great difficulty, either of decision or of execution, been experienced. We are, however, often called to a class of cases where our utmost judgment, patience, and skill will be needed. I refer to those cases of arm presentation, where, in the language of Foster, "the membranes have been a long time ruptured, the waters totally evacuated, and the womb closely contracted around the fœtus, which is then thrust considerably into the pelvis, the parts of the woman being dry, hot, tender, and often in a state of inflammation and tumefaction, especially when unskilful endeavours have been used to extract or turn the fœtus, or to dilate the parts."

In such a case, to force the hand through the os uteri would be to rupture that organ, and cause the death of the woman. It is admitted by all authors, I believe, that the operation must be postponed for a time, and means tried to soften the uterus and suspend its contractions. For this purpose all are agreed in the propriety of taking sixteen or eighteen ounces of blood from the arm, and following up this with a large dose (gtt. lxxx. to gtt. c.) of laudanum. Dr. Collins has proposed another remedy of great value. He says, "In such a situation, where the individual is strong and plethoric, twelve or fourteen ounces of blood should be taken from the arm, and a table-spoonful of the following mixture given every half-hour, which I have found exceedingly useful, both in quieting uterine action and inducing relaxation:

℞. Aquæ Fontis, ℥ vi.
Antim. Tartar. gr. iv.
Aceti opii, gtt. xxx. M.

By these means, after the lapse of a short time, we shall find the uterus relax, and the os uteri soften, so that with a little patience, gentleness, and time, we may attain our object.

3. When the cause is one of *placenta prævia*, or even of *accidental hemorrhage* (if it demand delivery), it is a general rule to operate as soon as possible. The os uteri seldom offers any resistance, owing to the loss of blood; and as this loss is necessarily increased by the natural efforts in unavoidable flooding, it is evident that the earlier we deliver, the better for the patient.

If we decide upon trying this operation in *convulsions*, *prolapsed funis*, or *ruptured uterus*, it will be wise to attempt it as soon as the state of the os uteri will permit.

502. Dr. Simpson has renewed the proposal of M. Velpeau* to substitute turning, in certain cases of distortion of the pelvis, for craniotomy, on the ground that the base of the skull being narrower than the interparietal diameter, and the head more compressible under tractile than expulsive efforts, the child might be delivered, and perhaps saved by a less severe operation. And further, that as turning might be attempted

* De l'Art d'Accouchement, vol i. p. 38.

at an earlier period than is usual for craniotomy in such cases, we might thereby afford the mother a greater security of a favourable result to herself. And he has supported his views by statistics taken from Dr. Collins' work, but without sufficient care and caution, as it appears to me.

Now let us examine into the practical application of his proposal. The bi-mastoid diameter in the 6 cases of measurement he gives, varied from $2\frac{5}{8}$ in. to $3\frac{3}{8}$ in.; and a living child can pass through a pelvis of $3\frac{1}{4}$ in. antero-posterior diameter with or without the forceps. With a pelvis of this size the operation is then unnecessary, and if the antero-posterior diameter of the pelvis be less than $2\frac{5}{8}$ in. the operation would be impracticable. Then these are the limits of the operation: for us to attempt to drag a child through a smaller space would be unjustifiable. For the success of the operation then, we must *be able to ascertain* that the pelvis is within these limits, and perhaps in some few cases, with whose former labours we are accurately acquainted we may do this, but in an immense majority of cases it will be, I think, impossible; and it happens, as Dr. Collins has shown, that the greater number of cases of difficult labour he met with were first cases, in which, of course, no such precise judgment could be attained.

Again, the life of the child is not secured and its chance but little increased, even if our estimate of the pelvic diameters be accurate; for if in turning with an ordinary-sized pelvis, one-third of the children are lost, the mortality will be surely more than doubled if its diameter be reduced more than one-fourth.

Moreover, if we should miscalculate the size of the pelvis, or if the head should be a trifle larger than usual, so far from the safety of the mother being increased it would be very seriously diminished; for we must then craniotomize the child after incurring the hazard of turning, and in a most unfavourable position.

Lastly, even if we succeed, in selecting a suitable case and in extracting the child, it has yet to be proved that the mother would not incur considerable danger from contusion or laceration in forcibly dragging the child through a narrow pelvis; for I must remind my readers that we have no statistics of the proposed operation to compare with those of the old method, the few cases adduced by Dr. Simpson being of no value for this purpose.

I must therefore object to the general adoption of Dr. Simpson's plan for the reasons above stated: the difficulty of ascertaining the exact diameters of the pelvis, the very little benefit to the child, the great risk to the mother of doubling the operation, and the uncertainty of benefit even in suitable cases.

In these conclusions I am very glad to adduce the concurrence of my friend Dr. Radford, whose papers are no doubt familiar to my readers in the pages of the Provincial Medical and Surgical Journal.

503. *Method of operating.* — This operation is usually divided into three stages; the introduction, the turning, and the extraction. I shall shortly describe these, in each kind of version.

1. *Cephalic Version.* — The rectum and bladder having been previously emptied, the patient is to be placed in the posture most convenient to the operator; some recommend that she should lie on her back, others that she should kneel, or lie on her left side, as in ordinary labour. The latter

position is generally adopted in this country. Whichever hand we choose to operate with is to be well oiled or soaped, and then insinuated through the os externum edgeways. Great gentleness will be necessary, and, contrary to the advice of some, it would seem better to do this during an interval of pain. When the greater part of the hand is in the vagina, it will be necessary to change its direction from that of the axis of the lower outlet, to that of the upper outlet. This will avoid all injury to the vagina, and will bring the points of the fingers to about the situation of the os uteri. Through the os uteri (and membranes if entire) the hand is to be insinuated very gradually, in a conical form, and during the interval of the pains; holding still, but not losing ground, when the pain comes on. When the hand is in the womb, if our object be to rectify the position of the head, it should be seized, and placed in one of the oblique diameters of the brim, with the posterior fontanelle corresponding to one of the acetabula — *i. e.* in the first or second position. If our object be to change the presentation — for example, to substitute the head for a shoulder — we must gently push up the shoulder, and then seizing the head, bring it down to the brim, and place it in the most favourable relation to the pelvis.

Having now done all that we can by the hand alone, it may be withdrawn, and the further progress of the labour left to the efforts of nature; should these be found inadequate, recourse must be had to the forceps.

This is the ordinary method of placing the head in position for descending; but Wigand has stated that it is possible, before the waters have escaped, to change the position of the head, or even the presentation, by external abdominal manipulations. Velpeau confirms this from his own experience, and something similar is stated by Sennert and Martins. Riecke has also related several such cases. Dr. Burns, in a note to his ninth edition, states, that "Mr. Buchanan, of Hull, informs me that he succeeded in one instance lately, 'where the left side of the breast of the fœtus lay diagonally over the pelvis, with the head forward,' in bringing the head right, by making the patient kneel and raise the breech, whilst the shoulders were brought as low as possible. The water had not been discharged. The situation of the head, when it came down, was made more favourable by the finger. The child was alive."

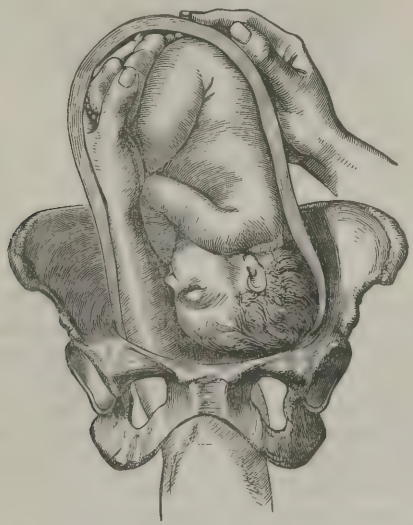
504. 2. *Podalic Version.*—I shall not repeat what I have said as to the mode of introducing the hand through the os externum and os uteri. The hand and arm will be our guide; for it is better not to attempt to put it back, much less to separate it, "after the manner of the ancients." Denman remarks, "In no case is it necessary, or in anywise serviceable, to separate the arm of the child previous to the introduction of the hand of the operator. In some cases to which I have been called, in which the arm had been separated at the shoulder, I have found greater inconvenience, there being much difficulty in distinguishing between the lacerated skin of the child and the parts appertaining to the mother. The presenting arm is never an impediment of any consequence in the operation, and therefore, in my opinion, ought not to be regarded, or on any account removed." Arrived at this point, an examination should be made as to the position of the child's body. Having ascertained all about it, the hand is to be passed over the *front* (chest and belly) of the child, as it is generally in front that we meet with the feet. It is often

a matter of difficulty to reach them, as well from the distance to be traversed as from the contraction of the uterus.

This part of the operation should be slowly and gently performed, resting occasionally, and keeping the hand quite still and flat upon the body of the child during a pain, so as to avoid both injury to the mother and great pain to ourselves from the violence of the uterine contractions.

Having found one or both inferior extremities, "before we begin to extract we must examine the limbs we hold, and be assured that we do not mistake a hand for a foot. The feet, being held firmly in the hand, must then be brought with a waving motion slowly into the pelvis. While we are withdrawing the hand, the waters of the ovum flow away, and the uterus being emptied by the evacuation of these, and the extraction of the inferior extremities, we must wait till it has contracted, and on the accession of a pain the feet must be brought lower, till they are at length cleared through the os externum."

Fig. 91.



The *turning* of the child is accomplished *during an interval* of pain, the feet being brought over the front of the child, and not over the back, which would risk dislocation of the spine; and as the feet are drawn down, the hand will ascend.

The extraction of the child is to be accomplished gradually *during a pain*, and in drawing downwards we should be careful not to place the fœtus in a wrong position as to the pelvis. Some advise us to leave the labour to nature, after turning the child, but to this Dewees objects. He says, "The whole act of turning should be considered as one of necessity rather than of choice; therefore, where it is proper to commence with it, it is, we believe, always proper to finish with it, and not trust the delivery to the powers of nature, after having brought the feet into the vagina, as recommended by some."

The case is now to be managed precisely as a footling case.

505. Throughout the operation I have spoken of bringing down *the feet;* it is now right that I should mention some modifications of this plan.

Fig. 92.

Peu, Burton, and Wm. Hunter recommend that the hips should be seized and brought to the brim of the pelvis. The latter, in his MS. lectures, says, speaking of arm presentations: "In this case you are to introduce the hand into the uterus, and gently put up the arm, and turn the child to a breech presentation. Reduce it if possible to a *perfect breech case*, that it may come more gradually, on account of the head and the navel-string, lest you strangle the child. If, however, you find this impracticable, let it come footling, but sustain the child at the hips as long as you can, they being, next the head, the largest and most unyielding part." In Germany it has been advocated by Schweighæuser, Schmidt, and Betschler. This plan, however, is seldom or never tried. The breech would be more difficult to seize and bring down by the head, and we should (as in cephalic version) lose all control over it, after placing it in position.*

506. *Again*, it has been strongly advised to hook down the knees instead of seizing the feet, by Burton, Delpech, and Breen. In this recommendation, Dr. Burns seems to coincide. I shall quote Dr. Breen's own statement of its advantages:

"By this proceeding (hooking the finger in the flexure of the knee) the child would be made to revolve on the lesser axis of the trunk, and the foot would be brought into the vagina within the reach of a noose. By

* A large blunt hook placed in the groin, affords very effectual control, unless there be some unusual mechanical difficulty in the case. — EDITOR.

adopting a different procedure, and endeavouring to lay hold of a foot according to the usual directions, it is obvious that the hand of the operator must traverse a greater space of the uterus — a matter of very considerable difficulty, either when the action of that viscus is strong, or when it is closely contracted on the body of the child. This difficulty being surmounted, when the foot is laid hold of, it is very apt to slip and recede from the grasp, as well from the violence of uterine action, as from the hand being cramped and nearly powerless by reason of the previous exertion. By adhering to the direction of hooking the knee, the hand of the operator is in a great measure protected during the pains, and he is enabled deliberately to proportion the force requisite to change the position, to the resistance he encounters. Besides, as the knees must have been nearly in contact with the superior part of the abdomen, from the earliest development of the extremities of the embryo, should what may be called accidental circumstances have removed them from this natural and usual position, but little force will be requisite to restore them to it."*

Of course, should a foot be nearer the os uteri than a knee, Dr. Breen would advise its being seized.

These reasons certainly appear of sufficient weight to justify the admission of Dr. Breen's suggestion, as an improvement upon the previous mode of turning.

507. *Lastly.* As it is not always easy to seize both feet, we are told by many writers not to be solicitous about the second, but to extract by one alone. The reason given is simply to avoid pain to the mother, and to save the difficulty and trouble of seeking for a second. A similar recommendation has been given by my intelligent friend, Dr. Radford of Manchester; but for very different, and, as far as my experience goes, for very valid reasons:

"The results of practice," he says, "prove, what might be inferred by reasoning, that the *child's life is much more frequently preserved in those cases in which it presents the breech, than where the feet come down first.*" "Is there, then, no practice which would enable us to bring down a part, approximating in its measurements to those of the breech presentation, which we have already stated to be so safe to the child, but which cannot be effected in turning operations? There is, — and this practice consists in NEVER *bringing down more than* ONE FOOT in the manual operation of turning a child."

The following measurements were obtained from children born at the full period of utero-gestation:

The circumference	of that portion of the head which presents in labour, is from	12 to 13¼ inches.
Do.	of the breech, with the thighs flexed upon the abdomen, as in breech presentations, from .	12 to 13½ do.
Do.	of the breech, *with one thigh turned upwards towards the abdomen the other extended*, from .	11 to 12½ do.
Do.	of the hips, the legs extended as in feet presentations, from	10 to 11½ do.

It is evident from these measurements, that it will be safer for the child to bring down only one foot, for inasmuch as the breech with the thigh turned up is more bulky than the hip with the legs extended, by so much

* Edinburgh Med. and Surg. Journal, vol. xiv. p. 29.

will the passage be better prepared to admit the quick transit of the child's head, upon which the safety of the infant depends.*

Dr. Simpson recommends seizing one knee, and that the opposite to the upper extremity which presents, *i. e.* if the right arm present, the left knee is to be brought down.

508. From what has been stated, it will appear that the *difficulties* of the operation are almost entirely owing to the uterus being in action. When it is quiescent, or nearly so, the operation is easy; but when the contractions are violent, it is often tedious, difficult, and very painful, both for the patient and operator. These contractions equally impede the introduction of the hand, the finding of the feet, and the turning of the child. Once so much is accomplished, they become of valuable assistance in completing the delivery.

509. The *danger* to the mother may arise — 1. From the operator not changing the direction of his hand, in accordance with the pelvic axes, and consequently pushing his fingers through the vagina.

2. The hand may be forced through the walls of the uterus, if too much force be used in searching for the feet.

3. The uterus may bruise itself against the hand, or the limbs of the fœtus, during the turning.

4. Without any evident injury, the irritation of the operation may give rise to subsequent inflammation.

5. The nervous shock may be serious, or even fatal.

The simple enumeration of these dangers ought, one would think, to go far towards obviating most of them.

510. The danger to the child consists—1. *In compression of the funis*, which commences about the time the buttocks appear at the os externum. After this time, if there be much delay, the child will perish from the interrupted circulation, unless by chance the cord should have lodged in the angle at the junction of the os sacrum with the os ilium. To obviate this danger, it was proposed by Pugh to introduce a pipe into the child's mouth, and excite respiration, whilst the head was yet in the vagina. Bigelow and Baudelocque are said to have employed this in practice.

2. If much extracting force be used, the spine may be dislocated; the hips also; and the leg has been pulled off.

3. Compression of the head is enumerated by Dewees as one of the dangers to which the fœtus is exposed.

511. It only remains now for me to say a word as to the *after treatment*. The patient will probably need an anodyne after the operation, and it is good practice to join a few grains of calomel with the opium or Dover's powder. It will be necessary to exercise great watchfulness to detect the

* "I have not," says Dr. Huston, in a note to a former edition, "for the last twenty years, attempted to bring down both feet, unless I had strong reasons for believing the child to be dead, or from the existence of some circumstance requiring rapid delivery, as convulsions, hemorrhage, or laceration of the maternal organs; and under these circumstances only when it could be accomplished with facility. For the reasons mentioned by the author, it is certainly safer for the child to deliver by bringing down only one foot, whilst there is no more difficulty, and in fact, less for the operator, than in turning and delivering by grasping both feet. If any more force be necessary to bring the hips of the child through the soft parts of the mother, than can be prudently exerted on one limb of the child, a finger, or the blunt hook, applied upon the opposite groin, will supply the requisite aid."—EDITOR.

first inroads of inflammatory action, which must be met by antiphlogistics, according to the strength of the patient, and the violence of the attack.

Careful inquiry should be made as to the character of the lochial discharge each day, and if necessary the vagina may be syringed with warm water.

The most absolute quiet and rest are desirable. If the infant be alive, the mother should not be teased with it for some hours.

CHAPTER XI.

OBSTETRIC OPERATIONS. 3. THE VECTIS OR LEVER.

512. So many claims have been put forth to the invention of this simple instrument, that it is not very easy to trace it to its author. It has been ascribed to Celsus, to Mauriceau, to Schitling, and to Palfyn; but the credit, so far as I can judge, belongs to Henry Roonhuysen, from whom it is extremely probable that Dr. Chamberlen obtained a knowledge of the invention. To others it was also communicated, but "for a consideration;" and the matter was kept secret, until in 1753 two Dutch practitioners, MM. Jacobus de Visscher, and Hugo van de Poll, whose names deserve most honourable mention, and more especially as they did not practise midwifery, conceived the project of making public a discovery which promised such valuable results. They bought the secret for a large sum of money (Baudelocque says 5000 livres de France) of Gertrude de Bruyn, daughter of Jean de Bruyn, and wife of Herman van der Heiden, and immediately published an account of it in the Dutch language, thus terminating the secret history of the vectis.

I have not been able to ascertain that the Chamberlens imparted a knowledge of the vectis to any practitioner in this country, although at the time of the publication of Visscher and Van de Poll, the forceps was ordinarily used in London. Since then it has obtained more or less notice in works on midwifery, though it has been to a great extent superseded in practice by the forceps.

513. In France, Mauriceau invented an instrument something like the vectis, for the purpose of extracting the head when separated from the body. In 1715 Isaac de Bruas, and in 1738 M. Rigaudeaux, constructed each a vectis, to meet the difficulty of certain cases to which they were called. In 1753 Warroquier, of Lisle, used one blade of Smellie's forceps as a lever. After the publication of Visscher and Van de Poll, the instrument occupied the attention of the profession, who were much divided in opinion as to its merits. At present it is but slightly esteemed.

514 As it was amongst the Dutch the vectis originated, so do they appear to have estimated it most highly, and cultivated it most successfully.

In addition to the names of Henry and Roger Roonhuysen, I may mention those of Ruysch, Boekelmann, De Bruyn, Plattman, Boom, Rooy, De Moor, Visscher, and Van de Poll; of Titsing, Halfyn, Berkmann, Van der Haar, Stylcke, Jans, De Bree, De Bruas, Van Geuns,

Rathlauw, &c. Van Sweiten, in his Commentaries upon the Aphorisms of Boorhaave, published in 1754, refers to the discovery of this instrument as a benefit conferred on the human race. He remarks: "Quamvis autem egregii viri, qui varios forcipes invenerunt, aut perfecerunt, omnem laudem mereantur, et ob industriam et ob candorem, quo sua inventa publicò communicaverunt, tamen videtur *vectis* ille *Roohuysianus* reliquis esse præferendus."

The celebrated Camper published a paper in 1774, in which he advocated the use of the lever, and spoke highly of its advantages.

In 1794 Johannes Mulder published a very learned and valuable history of the forceps and vectis.

515. The vectis of Roonhuysen (fig. 93), is thus described by M. Preville, from the memoir of Visscher and Van de Poll: "L'instrument de Roonhuisen est un morceau long et quarré de fer bien forgé, de $10\frac{3}{4}$ pouces de long et large d'un pouce: son épaisseur sans être garni est de $\frac{1}{8}$ d'un pouce, et étant garni, de $\frac{3}{8}$ d'un pouce. Ce fer est droit au milieu de la longuer de 4 pouces, et se courbe insensiblement vers les extremités. Ces courbures sont à peu près semblables, et étant mesurées dans leur concavités, elles ont 3 pouces $\frac{1}{4}$ de courbure et environ $\frac{3}{8}$ de pouce de fond. Ce levier de fer doit être soigneusement arrondi de tous côtés, et

Fig. 93.

Fig. 94.

principalement aux quatre coins, afin qu'il ne puisse pas faire du mal lorsqu'on l'appuie. C'est pourquoi les extremités des courbures, quoique bien arrondies, doivent être garnies d'un emplâtre de diapalme étendu sur du gros linge de la longueur d'un pouce en dedans; le morceau droit

du milieu situé entre les deux courbures, et par lequel se fait la plus forte pression contre les os pubis, doit être tout à fait garni de cet emplâtre, et un peu plus fort au milieu. Il faut surtout avoir attention que ces emplâtres soient appliqués fort également sur le fer, sans le moindre pli. Après avoir garni le fer de ces emplâtres, on le garnit tout entier de peau de chien mince et fort douce, et il faut observer que cette peau doit être appliquée fort unie, et que les coutures de la peau soient au dehors, c'est à dire, du côté convexe de l'instrument." It is added, "Nous avons trouvé une petite corde entortillée autour d'un des bouts de l'instrument, dans l'endroit où la courbure est plus grande, comme on le voit même dan la figure; ce que nous croyons ne servir à autre chose, si non pour marquer qu'on doit se servir de ce côté plutót que l'autre, ou pour mesurer l'approche de l'instrument."

516. Many changes have been made in the form of the instrument and in the materials of which it is formed. Titsing padded it with wool; Moraud and Herbiniaux made it of ivory; others of wood, bone or silver.

"When the vectis was first known in this country," says Dr. Denman, "that described by Heister was preferred to those recommended by the surgeons of Amsterdam. The vectis used by Dr. Cole was like one blade of the forceps, somewhat lengthened and enlarged. That of Dr. Griffith was of the same kind, with a hinge between the handle and the blade; and that of Dr. Wathen was not unlike Palfyn's, but with a flat handle and a hook at the extremity of the handle, which prevented its slipping through the hand, and might be occasionally used as a crotchet. Many other changes have been made in the construction of the instrument, but the vectis now generally used is of the following dimensions: The whole length of the instrument before it is curved is $12\frac{1}{2}$ inches. The length of the blade before it is curved is $7\frac{1}{2}$ inches. The length of the blade when curved is $6\frac{1}{2}$ inches. The widest part of the blade is $1\frac{3}{4}$ inch. The weight of the vectis is $6\frac{1}{2}$ ounces. The handle is fixed in wood."

The one in ordinary use (fig. 94) is that described by Dr. Lowder, and improved by Mr. Gaitskell, who says, "The vectis should be thirteen inches in length, one half to form the handle, the other the curve. The handle should be made of hard wood, rendered rough for the purpose of obtaining a firmer hold, and made to screw on and off. When the instrument is made with a hinge handle, it is very difficult to introduce; therefore this construction of the instrument should never be adopted."

517. The *nature of the aid* afforded by the vectis is threefold:

1. To correct malpositions, or aid the natural rotations of the head at the brim, or in the cavity of the pelvis; and to this the majority of French practitioners limit its employment.

2. *As a lever* of the first or second kind, *i. e.* making a fulcrum of the pelvis, or of the left hand of the operator external to the pelvis. Its employment in the first way is extremely hazardous from the certainty of crushing the soft structures lining the pelvis, and the probability of injuring the urethra or the child's head. Many authorities who employ and recommend the lever, would altogether reject it, and I think justly, rather than so use it. This objection does not hold against the second mode, which is the proper one, if it be employed as a lever at all.

The discoverers and first possessors of the secret, made the arch of the

pubis the fulcrum. In order to avoid the urethra, Boom, Boekelmann, and Titsing rested it upon the ramus of the ischium.

3. *As a tractor.*—Dr. Burns says, "It is unfortunately named, for it ought not to be employed to wrench, but to hook or draw down the head; and its proper application would be less apt to be mistaken were it called the tractor." This can only be done with the curved vectis; with the one used by Roonhuysen no tractile power could be exerted. When the force thus employed is sufficient, it is by far the safest application of the instrument.

518. The *cases suitable* for the employment of the vectis appear to be the following:

1. Before the head has fully entered the upper outlet, when, either from slight malposition, or from very slight narrowing, the uterine efforts are ineffectual in advancing the labour.

Froriep advises it in cases of face presentation, and after version, when the head is difficult to extract.

2. It was recommended by its early patrons in cases where the head had become impacted in the pelvis: in fact, it was considered as superseding in a great measure the use of the crotchet. After the description I have given, I need hardly say that it is not merely powerless in such cases, but very likely to be injurious.

Levret, and some other French writers, have admitted its employment in some cases where the head was rather tight in the passage — to use their own words — on the point of being "enclavée," but not when impacted.

I have hitherto deferred stating the two principal conditions of its employment, even in these cases, viz. *the presence of labour pains*, without which there could not be a chance of success; and *the dilatation of the os uteri.*

3. The case which appears to me most suitable for the use of this instrument, and in which the probability of success is greatest, is that in which the head having descended into the pelvic cavity, is arrested in its progress, not by any mechanical impediment, but by the inefficiency (not absence) of labour pains, and when the patient is beginning to show symptoms of constitutional or local disturbance. This condition does not take place until the second stage of labour has lasted some time, and as, after these symptoms have shown themselves, there is danger to the patient in further delay, it is important to obtain aid.

"In this most favourable presentation," says Dr. Breen, "the uterine action is occasionally for hours exerted in vain, from causes which we are frequently unable to account for. Much delay may excite fears for the safety of the child, and lay the foundation of a tendency to inflammation in some of the soft structures of the mother; indicated by some one, or several of the following symptoms; increased frequency or fulness of the pulse; tongue loaded in its centre, secretion of urine diminished, and becoming higher in colour, sometimes requiring to be drawn off by the catheter; countenance assuming an anxious aspect; stomach irritable; general increase of restlessness."

Now as there is supposed to be space enough, and pains, though feeble, a slight additional force will often succeed in bringing the infant into the world at once. As there is nothing in the nature of the operation to add

to the danger, and especially as the tractile force will probably be sufficient, it seems peculiarly suitable to this case; and I may add, that all the testimony I can collect is in favour of its application.

4. In cases of convulsions, or other accidents occurring during labour, provided only that the pains continue, the assistance of the lever may be sufficient to terminate the labour.

519. As to the *time* when the instrument may be most advantageously used, I may adopt the words of Mr. Dease: "It requires a certain degree of cool discernment, which I believe is only acquired by long practice, to know when a woman is still capable of assisting her labour, or when the head is sufficiently low in the pelvis to use the extractor."

If the object desired, be to aid the head in passing through the upper outlet, or to rectify its position there, it will be well to operate so soon as the os uteri is dilated or dilatable.

When the head is in the pelvis, it is desirable to have it as low down as may be, as the operation is then much easier.

"Under these circumstances," says Mr. Dease, "I think it best to examine the woman as she lies on her side: if the surgeon finds that the head is sunk deep in the pelvis towards the sacrum, at least one-half, he may apply the extractor: he should not form his judgment of the descent of the head from examining towards the pubis; for here, from the shallowness of the pelvis, and the swelling of the scalp, he will be very apt to be deceived, and imagine the head to be much lower down than it really is."

In coming to a conclusion on this point, however, regard must be had to the constitutional symptoms; if these be urgent, it would be unwise to lose time after the period at which the vectis may be easily applied.

The occurrence of any of the accidental complications, will in each case determine the period for operating, according to the urgency of the symptoms.

520. I regret much not having any *statistical results* to submit, but in this, as in too many other cases, practitioners seem to have concluded, that as the instrument is said to be quite safe, it was therefore useless to record the facts.

De Bruyn is said to have used it successfully 800 times in 42 years.

MM. Titsing and Berkmann used it 262 times in 24 years, and saved 80 or 90 children in the 100.

521. As to the *comparative results:* the *alternative* of the vectis is the forceps, and their respective merits have been the subject of controversy with most writers who have treated of them. Upon reading over the different sides of the question, it would seem that each writer has taken up the subject too much as a partisan. To compare their utility in certain cases, is little more than a waste of words; as, for example, where the pains have ceased, or where compression is required to extricate the head of the child. In such cases, the vectis is of no use, and it would be highly reprehensible to employ it. But where there is room, and when the pains persist, there the vectis being sufficiently powerful, has this signal advantage, that there is but one blade to be introduced, and but the thickness of that one blade added to the child's head. It is possible that the single blade may be able to act where the bulk of two would render extraction impossible. These appear to me to be the peculiar ad-

vantages of the vectis, and therefore I shall not detail the controversy more fully, but refer to the works of Osborn, Bland, Denman, Camper, Herbiniaux, Levret, Burns, Conquest, &c., &c.

One point, however, I must notice, which has been urged in favour of the vectis, viz., the secrecy with which it may be used. Now this I consider a decided disadvantage. I most fully agree with the opinion of Dr. Osborn, and shall make no apology for transcribing it at length, as it applies forcibly to all midwifery operations:

"In the first place I am persuaded, that if concealment in the use of the means intended for relief in laborious or difficult labours be not permitted, but that the absolute necessity of such means be first established, and that every practitioner be obliged openly and avowedly to use them, we should never again hear or read of one person having used the vectis in 800 and another in 1200 cases (Van Swieten, Camper, and Herbiniaux). Nor shall we again hear of the great number of women which some practitioners are constantly boasting of having delivered; for no man can attend a great number of women in labour, in the manner he ought, in the way nature demands, or a conscientious discharge of his duty requires. Nor do real difficulties occur so often, as to render it possible to believe, that any man's life could afford such numbers of difficult cases as are stated in the printed accounts from abroad. As I feel thoroughly convinced of the propriety and necessity of a fair and candid avowal of the use of instruments, in every case of midwifery where they are to be employed, so I must insist that their concealment cannot be justified by any proper motive. Such an open avowal implies a conviction in the practitioner's mind of that irresistible necessity for their use, that supersedes every other consideration; it implies a consciousness of the rectitude of his conduct, and it implies a voluntary acceptance of the consequences of the operation, which ought to make part of his professional duty: and it clearly demonstrates to the satisfaction of the patient and her friends, that no motive of convenience to himself could urge him to an operation which may prove ruinous to his own reputation and interest. Besides, not to insist upon that responsibility from the operator, is to deprive the patient of the best and surest security against a precipitate performance of the operation. If once the practitioner can rest assured, that, let the event of the case be ever so unsuccessful, the injurious effects of his operation will be buried in eternal oblivion, by blending the mischief arising from the indiscreet use of instruments with the natural consequences of labour, he will certainly have nothing to weigh against the tempting advantages of convenience or emolument to himself; but while he is shortening the duration of the most irksome part of his professional duty, the waiting upon a slow and lingering labour, he will flatter himself, that, by delivering, he is doing an acceptable service to his patient, in shortening the duration of her sufferings."*

522. Method of operating. — Premising then that the case is one adapted for the vectis, that there is space enough, that the os uteri is fully dilatable, if not dilated, that there are pains, and that the patient and her friends have been made acquainted with our intention, it next remains for us to consider the method of using the instrument:

* Essays on Midwifery, p. 144.

1st. As a lever, and,

2dly. As a tractor.

1. *As a lever.* — The first point to be decided is, over what part the instrument is to be applied; and here we have latitude enough.

"Some," says Dr. Gooch, "apply it over the occiput; others behind the ear, by which it has a bearing against the prominence of the mastoid process; and others against the chin. The two first are perhaps the best when the head is high, as considerable force is required to move it, which may be employed with more safety against either the occiput or mastoid process than against the chin. But when the head is low down, resting on the perineum, less force will be necessary, and the vectis may then be applied against the chin; but the instrument requires to be used with great caution, lest the jaw should be injured."

De Bruyn applied it over the mastoid process; Camper over the lower jaw; Lowder on the forehead, &c., &c.

I have already pointed out the temptation to make the soft parts of the mother the fulcrum, and the mischiefs which result. As far as my judgment extends, it would seem that the vectis ought never to be used as a lever of the first class; even as one of the second class, much caution will be necessary.

"When an instrument of this sort is used, it is proper to make the hand the fulcrum on which it acts: now if the force required is but small, this may certainly do well enough, but where great force is required, this is a very bad support; besides the bony parts of the pelvis lie so convenient, that we may rest our instrument on any part of it. Yet we should recollect, that whatever part we convert into a fulcrum, we injure more or less, according to circumstances. If we apply it over the symphysis pubis, we press upon the urethra; or if in other situations, we shall injure the clitoris or vagina."*

"The injuries inflicted indeed must have been frequent and great—and this led Pean, in 1772, to suggest the possibility of delivering by the vectis, without making a fulcrum of the mother's structures. He proposed a practice, which is now sometimes adopted, of grasping the shank of the instrument with the left hand — the outer edge of the little finger being applied towards the vulva — making that hand the fulcrum, and pressing the extremity of the blade on the child's head, by raising the handle firmly on the right."†

Having determined on what part of the infant the lever is to be applied; the instrument is to be well warmed, greased or soaped, and the patient placed in the usual position for delivery, on her left side; the operator is to introduce one or two fingers of his left hand to serve as a director for the vectis, which is to be carefully and gently passed over the convexity of the child's head, until it has reached the point to which the force is to be applied.

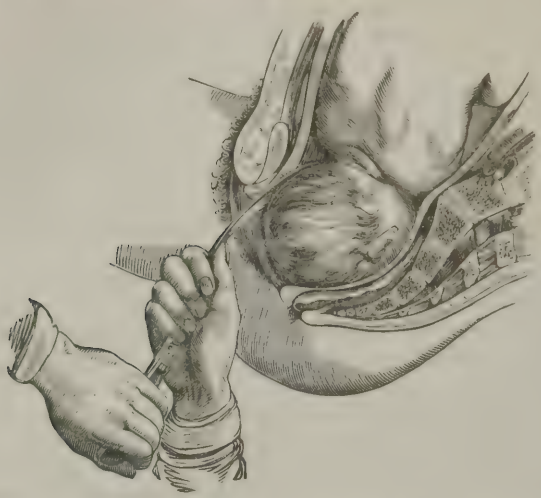
"This attained, the handle should now be held firmly with the right hand, while the index and middle finger of the left, fixed about two inches from the screw part, within the vagina, become a fulcrum. On this ful-

* London Practice of Midwifery, p. 208.

† Ramsbotham's Lectures in Medical Gazette, May 31, 1834, p. 307. See also Baudelocque, vol. ii. p. 47.

crum or point of support, the instrument is made to move from the sacro-iliac symphysis towards the hollow of the ilium, by the action of the right hand on the handle. In this way it describes the section of a circle, and glides on to the occiput. Should the occiput point to the right ilium,

Fig. 95.



the left hand must be employed; if to the left ilium, the right hand must be used. When a pain takes place, the accoucheur should gently aid it by drawing down in the axis of the pelvis. In this way the occiput is depressed, while the chin approaches the child's breast, and the head is reduced to the smallest compass, and is thus enabled to pass through the cavity of the pelvis. As soon as the occiput is brought so low as to press on the perineum, the instrument should be withdrawn, and re-introduced with the usual precautions. The object now in view is to place the instrument over the face of the child. To effect this, the hand must be passed up, as at first directed, to the right or left sacro-iliac symphysis, according to the situation of the face. When the instrument gets above the brim of the pelvis, a finger or two must be inserted by the side of the instrument, and pressed on till it passes over the forehead on to the face, so as to embrace the chin. The practitioner has now nothing to do but to draw down during the time of pain, increasing the power according to the degree of resistance."*

Or if we prefer it, the right hand, grasping the handle, may be made the fulcrum, and the force applied by the left hand at the junction of the blade and handle, directing it downwards and backwards until the descent of the head is accomplished.

"If the instrument should slip, a fresh purchase must be obtained. As the head passes over the perineum, the efforts may be relaxed; and if the pains appear sufficient, it may be withdrawn altogether, and the termination left to nature."

* Gaitskell, London Medical Repository, November, 1823, p. 380.

523. 2. *As a tractor.* — The preliminary steps, introduction, &c., are the same as when it is used as a lever; but instead of making use of one hand as a fulcrum, both hands are employed in the one office of maintaining a firm purchase, and drawing downwards and a little backwards during the pains. The effort is to be relaxed during an interval; and this alteration of traction and rest is to be continued until the head has descended to the inferior outlet. As before, it may be allowed to pass over the perineum without assistance, if the pains be adequate to its expulsion.

524. There is, I believe, no *danger* to the mother or child when the vectis is in skilful hands, but in those of the ignorant or inexperienced great mischief may be done.

1. It may be introduced before the os uteri is dilatable; of this error, contusion, laceration, and death may be the consequences.

2. By an incautious mode of passing the instrument, the parietes of the uterus may be ruptured.

3. By employing the extracting power, without bearing in mind the different axes of the pelvis, and the position of the fœtal head in relation to those axes, the lever will be inefficient, and the mother injured.

4. By passing the instrument outside of the uterus instead of within its cavity, a fatal wound may be inflicted.

5. By exerting the power without regard to the pains, the operation will be in vain.

6. By making a fulcrum of the soft parts of the mother, much injury may result.

7. By exerting too much force as the head passes over the perineum, or neglecting to support it, you may tear the perineum, so as to lay the genital fissure open into the anus.

8. By making too much pressure with the point of the instrument upon the part of the child to which it is applied, a wound may be inflicted.

525. The subsequent *treatment* varies very little from that required after ordinary labour; there is very little shock, and no injury, if the operation be skilfully performed. The parts should, however, be carefully examined, and, if necessary, a spirit lotion applied. The same treatment should be applied to the head of the child, if the instrument have bruised the integuments.

CHAPTER XII.

OBSTETRIC OPERATIONS. 4. THE FORCEPS.

526. It will be at once admitted, I believe, that the greatest triumph of surgery is to diminish the frequency of operations, and to substitute those of minor severity and danger, for others involving more serious risk. If this be true, then it must be granted that the invention of the forceps, and their employment in practice, is the greatest improvement recorded in the annals of operative midwifery. Before the introduction of this instrument, the only extracting force at command was obtained by the insertion of a hook into the head of the child — such as is now used in the operation of craniotomy.

This proceeding must of course have been fatal to the child in an immense majority of cases, and the very few who were born alive, must have been subsequently endangered by the mutilating process employed in the delivery. But this was not all; every man possessing common feelings of humanity must have shrunk from the painful necessity of such a proceeding, and have deferred the operation as long as possible, by which the danger to the mother was greatly increased.

Now, from this double risk and fearful mortality we have been relieved by the invention of the forceps; for although we are still obliged to destroy the child occasionally, to secure the safety of the mother, yet this class of cases is incomparably smaller than that in which, by the timely application of the forceps, both the child and mother escape injury.

For these reasons, I conceive that I am justified in stating that the invention and employment of this instrument is the greatest improvement that has ever occurred in midwifery, even though I may not go the length of certain of its advocates, in asserting that it is entirely without danger to the mother or her infant.

527. It cannot be said that the ancients were altogether ignorant of this method of extracting the infant, although it does not appear to have been generally known. Mulder, in his valuable work, gives the following extract from a translation of the works of Avicenna: "Oportet ut inveniat obstetrix possibilitatem hujusmodi fœtus, quare subtilietur in extractione ejus paulatim; tunc si valet illud in eo, bene est; et si non liget eum cum margine panni et trahat cum subtilitur valde cum quibusdam attractionibus. Quod si illud non confert administrentur forcipes, et attrahatur cum eis; si vero non confert illud extrahatur cum incisione, secundum quod facile fit, et regatur regimine fœtus mortui."

This very distinct allusion to the forceps seems to have made no impression, for we find no similar attempt to extract the child until the middle of the sixteenth century; at which time (1554) Rueff recommended an instrument resembling a pair of lithotomy forceps, for the purpose of extracting dead children, or of supplying a deficiency of manual force. It does not appear, however, that he appreciated the value of the forceps as subsequently employed, nor did his contemporaries carry out his sug-

gestion, for it was not until a century later that the instrument was brought into practice.

Before the time of the Chamberlens, it was unknown in England, and even at the time that Dr. Hugh Chamberlen published his translation of Mauriceau, in 1672, it was still a secret. No allusion to such an instrument is to be found in Raynald's work (1634), nor in the translations of Portal (1705), Deventer (1716), or La Motte (1745).

528. In his preface to the translation of Mauriceau, to which I have referred, Dr. Hugh Chamberlen, after mentioning the method of extracting the child by hooks, observed, "But I can neither approve of that practice, nor of those delays, beyond twenty-four hours, because my father, brother, and myself (though none else in Europe, as I know) have, by God's blessing, and our industry, attained to and long practiced a way to deliver women in this case without any prejudice to them or their infants; though all others (being obliged, for want of such an expedient, to use the common way) do and must endanger, if not destroy, one or both, with hooks. By this manual operation, a labour may be despatched (in the least difficulty) with fewer pains and sooner, to the great advantage and without danger, both of woman and child; if, therefore, the use of hooks by physicians and chirurgeons be condemned (without thereto necessitated through some monstrous birth), we can much less approve of a midwife using them, as some here in England boast they do, which rash presumption in France, would call them in question for their lives."

This extract, however, does not fix the date of the invention by Dr. Chamberlen, nor have we any accurate data for doing so. Through the kindness of a friend, I possess a pamphlet ("A voice in Rhama") by Dr. Peter Chamberlen, published in 1647, in which he speaks of his father's (Dr. Paul Chamberlen) discovery for the saving of infantile life. This would fix the date of the discovery some time before 1647. Of the sons, Drs. Peter and Hugh Chamberlen are the only ones whose names are familiar to us.

From some inaccuracy of expression in the extract I have quoted from Dr. Hugh Chamberlen's preface, it was even doubted whether the instrument alluded to was the forceps, but that doubt has been set at rest by Mr. Cansardine, who has published an account of the discovery of Chamberlen's own instruments.

"The estate of Woodham Mortimer Hall, near Maldon, in Essex, was purchased by Dr. Peter Chamberlen, some time previous to 1683, and continued in his family till about 1715, when it was sold by Hope Chamberlen to William Alexander, wine merchant, &c."

In an old chest, found in one of the chambers of this house, certain obstetric instruments were discovered, along with "old coins, trinkets, gloves, fans, spectacles, &c.," and were presented to Mr. Cansardine, who thus describes them: "First, we have a simple vectis, with an open fenestrum; then we have the idea of uniting two of these instruments by a joint, which makes each blade seem as a fulcrum to the other, instead of making a fulcrum of the soft parts of the mother; and which also unites a power of drawing the head forward. This idea is at first by a pivot, which being riveted, makes the instrument totally incapable of application. Then he goes to work again, and having made a notch in each vectis for the joint, he fixes a pivot in *one only*, which projecting, is to be received

mto a corresponding hole in the other blade, after they have been applied *separately*. It may be observed, that although there is a worm to the projecting part of the pivot, yet there is no corresponding female screw in the hole which is to receive it. Every practical accoucheur will know, that it is not easy, or always possible, to lock the joints of the forceps with such accuracy as to bring this pivot and hole into opposite contact. This Chamberlen soon discovered, and *next* produced a more light and manageable instrument, which, instead of uniting by a pivot, he passes a *tape* through the two holes, and winds it round the joint, which method combines sufficient accuracy of contact, security, and mobility."*

There can now be no doubt of the credit of the invention being due to Dr. Paul Chamberlen, and I have proved that it took place before the year 1647. The secret was, however, carefully preserved, nor had it been communicated in the year 1716, for in Dr. Hugh Chamberlen's third edition of Mauriceau, published in that year, the passage I have quoted is continued in the preface.†

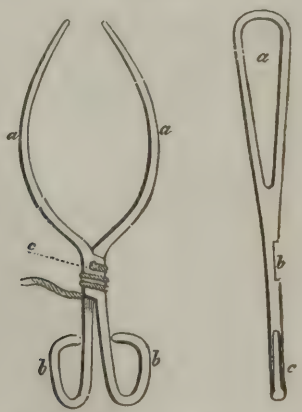
About this time, or soon after, the secret appears to have been communicated to one or two, for Dr. R. W. Johnson, when speaking of the forceps, says: "Besides these, I have a pair of forceps, which did belong to the late Mr. Drinkwater (late Surgeon and Man-midwife at Brentford), who began practice in 1668, and died in 1728. The size and form of this pair agree with those of Chapman and Giffard, save only that the hooks of the handle are turned outwards."

* Mr. Cansardine's paper in Med. Chir. Trans. vol. ix. p. 183.

† "The accompanying cut is taken from a drawing of the most perfect of Chamberlen's instruments. No. 1 is the forceps locked: *a*, the blades; *b*, the handles; *c*, the hole in the joint, through which is passed the string to connect the blades.

"No. 2, the front view of a single blade: *a*, the fenestra; *b*, the groove in the shanks forming the lock, by which the two blades, perfectly similar in form, are adapted to each other; *c*, the handle.

Fig. 96.



"The following are the dimensions: extreme length, eleven inches and a half; length of blades, seven inches and a quarter; of handle, four inches and a quarter; greatest width between the blades, three inches and three-eighths; width between the blades at the points, three-fourths of an inch; greatest breadth of the blade, one inch and a half."—*Appendix to Dr. Ramsbotham's Principles and Practice of Obstet. Med. and Surg.*—EDITOR.

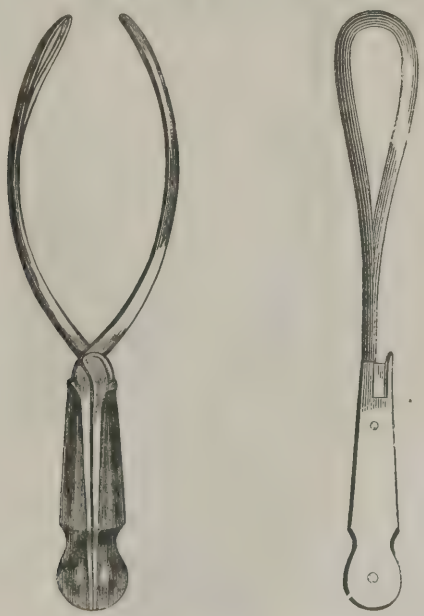
And Mr. Chapman, in 1733, published a description and a plate of the instrument, which he had used from the year 1726, stating it to be the instrument used by the Chamberlens; but without stating whence he procured it. I have not succeeded in discovering from whom he received it, though from his not claiming the merit of the invention, it is evident that it was communicated to him. He has, however, the great credit of being the first in these countries who published an account of it for the benefit of the profession.

After this period, the forceps is described and recommended for various cases by almost all British writers.

529. The credit of first introducing this instrument into French practice is due to Palfyn or Gilles le Doux of Ypres. One of the first persons who used it was M. Duse, whose example was followed by Mesnard, Gregoire, Levret, Coutouly, &c.

The earliest German practitioner who made use of the forceps appears to have been Cornelius van Solingen, in 1673; he was followed by Slevogt, Velsen, Schlichting, &c.

Fig. 97.



Short Forceps.

530. The original instrument has been variously modified according to the fancy of different practitioners.

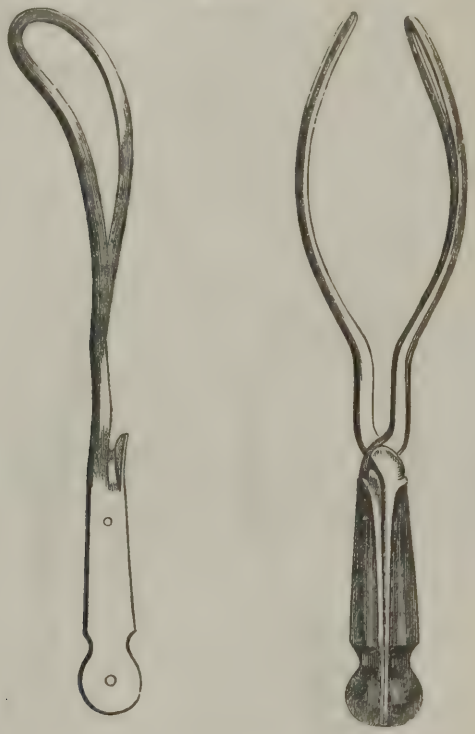
The chief peculiarities may be pointed out in a few words.

1. The most striking variation observable, is in the length of the instrument — some being sixteen or eighteen inches long, and others only eleven. The object of the greater length is evidently to enable us to act before the head has descended into the pelvis. The shorter forceps can

only be used when the head is in the cavity. The longer instrument possesses greater lever power, and requires greater skill and care in its management.

2. There is a considerable difference in the distance between the blades of different forceps when closed — some being nearly wide enough to admit an ordinary sized head, whilst others approximate very closely.

Fig. 98.



Long Forceps.

These instruments must necessarily possess a very different degree of force; with the latter the head may be powerfully grasped and compressed, and a great extracting force exerted, whereas the former can do little more than extract with moderate force, when the resistance is not great. The latter are the more useful in skilful hands, but the former are, perhaps, safer for ordinary use.

3. To some of the instruments a second curve is added, the convexity of which is intended to correspond to the hollow of the sacrum, and the concavity to the symphysis pubis, in order that the instrument may be applied in the axis of the cavity and upper outlet. The second curve ("curvatura nova," as Mulder calls it) has been added both to the long and short forceps. I do not believe that it is advantageous in either kind; in the latter it is often very inconvenient. "It is far better to have both

these instruments perfectly straight, the diversity of curves recommended by different writers answering no useful purpose."

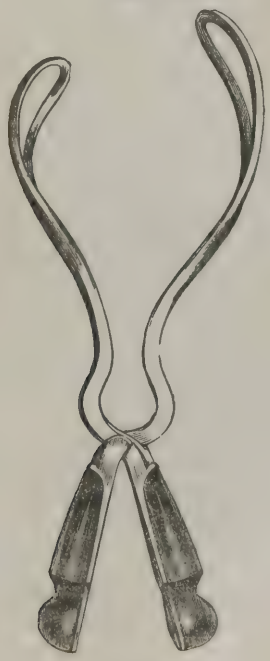
4. The fenestrum varies in length and breadth in different forceps — in some it is altogether absent, and in others it is very wide. The object of the latter modification is to avoid as much as possible adding to the bulk of the child's head, and to diminish the risk of injury to mother and child. I doubt whether the object be attained by this arrangement, and when the forceps are introduced antero-posteriorly, the additional breadth of the blade which is underneath the arch of the pubis, may prove very mischievous to the sides of the outlet.

5. In other forceps the breadth of the blade is continued to the handle, for the purpose of containing an opening, through which the other blade (which is slightly narrower) is passed, so as to insure their apposition.

6. Certain contrivances have been added to the handles of the instrument, to prevent their being pressed too closely together; and in some forceps the blades do not cross, in order to avoid compressing the child's head.

7. The blades have been wrapped with leather, to prevent injury to the scalp of the child. This plan is now very properly abandoned, as it could not be of any use, and rather added to the difficulty of introduction.

Fig. 99.



Radford's Forceps.

8. Mr. Radford has altered the long forceps, and, as he states, with great advantage. The blade, which is to be applied over the occiput, is

much shorter than the other, so that when it touches the neck, the other (owing to the oblique position in which the head descends) will embrace a great extent of the anterior part of the head. He has also lessened the compressing power of the instrument, by placing the joint nearer the outer end of the forceps.

9. Dr. Davis, of University College, London, has shown much ingenuity in varying the forceps, so as to meet the different circumstances in which they are required.

In London, a modification of Levret's forceps is used for the higher operation, and Smellie's for the cavity of the pelvis. In Edinburgh, both the long and short forceps are employed, with the single or double curve. In Dublin, the long forceps is rarely used; and the short one resembles Smellie's, without the second curvature. In France, Levret's forceps, or a modification of it, is in general use. In Germany, the forceps of Boer, Levret, Schmidt, Stark, Siebold, Brünninghausen, Naegelè, Osiander, &c.; and in Italy the forceps of Levret or Assilini are employed.

Since the first edition of this work I have taken some pains to modify the shape and proportions of the short forceps, and from the testimony of many practitioners, I think I may say that I have succeeded in improving the instrument, although the alterations are but slight. I still prefer the single curved forceps. The length should be 12 inches, of which the handles occupy 4. The interval between the points of the blades when closed should be 1 inch, and at the widest part of the curve 3 inches. The breadth of each blade at the widest part should be 1 inch, the fenestrum $2\frac{1}{2}$ or 3 inches long, having the lower part of the blade solid steel, to give greater firmness. The curve of the instrument should not commence for fully $3\frac{1}{2}$ inches above the handle, and will consequently be much increased towards the point. Lastly, the edges of the blades and fenestra must be nicely bevelled off. The advantages I have found from these changes are an increase of tractile power, without the necessity of grasping the handles so tightly, and compressing the head; the exact fitting of the head into the hollow formed by the curves, so as to avoid distending the perineum by a part of the instrument not actually out of use, and the prevention of springing and slipping by the solidity of the lower part of the blades.

The hand that is to use the instrument is, however, of more importance than the instrument itself, of which it may be observed with truth, that "that which is best administered, is best."

531. The *object of the operation* with the forceps is,

1. To facilitate delivery, when its progress is arrested by certain malpositions of the head, at the brim, or in the cavity of the pelvis.

2. To supply the want of uterine action, or to render it effective for the expulsion of the child.

3. To save the mother from the evil consequences of a labour too prolonged, and from the necessity of a severe operation.

4. To save the life of the child, or at least afford it a chance of escape from certain destruction.

532. That these objects are attainable, will, I trust, appear from the *nature of the aid* afforded by the forceps, and that they have been in many instances attained, the *statistics of the operation* will prove.

It was not for some time after the invention of the instrument that its

powers, and the limitations of those powers, were understood. The story of Chamberlen's Paris adventure is a good illustration. He visited Paris, and offered to deliver any patient the faculty chose with his instrument; they gave him a case of distorted pelvis; he tried, and of course failed, and left the city in disgrace. Had he carefully studied the cases to which the instrument was applicable, he would have been spared the annoyance.

533. It is evident that the forceps possesses a twofold power.

1. That of grasping and compressing the head of the child.
2. That of acting as a lever of the first kind, and as an extractor.

The compression exercised by it *must* be limited within the degree the head can bear without injury, and *may* be limited by the form of the instrument. The extracting force will be in proportion to the firmness of the grasp, and limited by the resistance, and the danger of injury to the mother.

Now it is ascertained, that if there be space sufficient, such a grasp may be obtained of the child's head, without injury to it, as will enable us to extract it, and that the extracting force thus exercised is not sufficient to injure the mother; thus the forceps may supply the want of uterine pains.

Many cases occur in which the transverse diameter of the child's head is slightly greater than the antero-posterior diameter of the brim, or the transverse diameter of the lower outlet; but where a slight additional compression would enable it to pass: now, if this do not exceed the amount of compression which the head will safely bear, and if the force required for extraction be not sufficient to injure the mother, such compression and extracting power may be afforded by the forceps, which will thus render the uterine action effective. No doubt it requires great tact and long experience to decide upon the probability of success, but we have high authority for the propriety of the attempt in such cases. To those who lack experience, the failure of a very cautious effort will be an adequate evidence of its impracticability, and with ordinary care, no mischief will be done.

Lastly, in most cases where the head is not impacted, a sufficient grasp may almost always be obtained, either at the upper outlet or in the cavity, to enable us to change the position of the child.

534. Statistics. — I trust I have made it appear, from the nature of the aid afforded, that the first and second objects of the operation are attainable; how far this is the case with the third and fourth must be shown by statistics. But before I give the results of the operation to the mother and child, it may be well to ascertain the average frequency of its occurrence. For these purposes, I have searched all the records within my reach, and the result is the following tables:—

FREQUENCY OF THE OPERATION.

a. *Among British Practitioners.*

Date.	Authors.	Total No. of Cases.	No. of Forceps Cases.	References.
1781	Dr. Bland	1,897	12	Merriman.
1787 to 1793	Dr. Jos. Clarke . . .	10,387	14	Trans. of Assoc. vol. 1.
	Dr. Merriman. . . .	2,947	21	Synopsis.
1818	Dr. Granville	640	5	Report of West. Disp.
1825 to 1833	Ed. Lying-in Hospital .	2,452	15	Reports.
1828	Dr. S. Cusack. . . .	398	1	Dub. Hosp. Rep. vol. 5.
1829	Do.	303	3	Do.
1826 to 1837	Dr. Collins.	16,414	24	Prac. Treat. on Midwf.
1834 to 1837	Dr. Beatty.	1,182	9	Dub. Jour. vols. 8, 12.
	Mr. Lever	4,666	9	Guy's Hosp. Reports.
1838	Mr. Warrington . . .	88	1	Amer. Med. Journal.
1840	Do.	110	3	Do.
	Mr. Mantell	2,510	6	Do.
1836 to 1840	Dr. Churchill	1,640	3	Researches, &c.
1849	Drs. M'Clintock and Hardy	6,634	18	Pract. Obs. p. 95.

b. *Among French Practitioners.*

Date.	Authors.	Total No. of Cases.	No. of Forceps Cases.	References.
1797 to 1809	Madame Boivin . . .	20,517	96	Mémorial, p. 337.
1803 to 1811	Madame Lachapelle. .	22,243	174	Prat. des Accouch.
1808	M. Ramboux	216	2	Velpeau.
1815 to 1828	M. Pigeotte de Troyes .	1,362	2	Do.
1829	M. Papavoine. . . .	24	1	Do.
1829	Hôtel Dieu, Paris . .	280	1	Do.
1830, 1831	Sig. Cinicelli	94	1	Do.

c. *Among German Practitioners.*

Date.	Authors.	Total No. of Cases.	No. of Forceps Cases.	References.
1801 to 1807	M. Richter, Moscow .	3,195	49	Velpeau.
1811 to 1827	Moschner and Kursak, Prague	12,329	120	Siebold's Jour. vol. 9.
1812 to 1813	C. v. Siebold, Wurtzburg	318	26	Do. vol. 1 to 3.
1817 to 1826	Do. Berlin . .	1,634	212	Do. vol. 3 to 8.
1827 to 1829	E. v. Siebold, Berlin .	491	77	Do. vol. 9 to 11.
1829 to 1833	Do. Marburg	344	34	Do. vol. 10 to 13.
1834 to 1837	Do. Göttingen	507	37	Do. vol. 15 and 16.
1825 to 1827	Dr. Kilian, Prague . .	2,350	120	Velpeau.
1808 to 1814	Dr. Henne, Copenhagen	555	1	Siebold's Jour. vol. 2.
1826	Do.	130	4	Do. vol. 8.
1821 to 1825	Dr. Riecke	219,303	344	Velpeau.
1819, 1820	Dr. Ritgen, Giessen .	180	20	Siebold's Jour. vol. 6.
1825	Dr. Merrem, Cologne .	142	5	Do. vol. 7.
1814 to 1827	Dr. Carus, Dresden . .	2,908	184	Do. vol. 9.
	Dr. Naegelè, Heidelberg	1,411	22	Velpeau.
1825, 26, 27	Dr. Klugè, Berlin . .	809	55	Siebold's Jl. vols. 7, 8, 9.
1825, 1826	Prof. Andrée, Breslau .	351	8	Do. vols. 7, 8.
1825, 26, 27	Dr. Brunatti, Dantzic .	284	22	Do. vols. 7, 9.
1825, 1826	Dr. Theys, Trier. . .	49	3	Do. vols. 7, 8.
1826	Dr. Voigtel, Magdeburg	29	3	Do. vol. 8.
1827, 1828	Dr. Küstner, Breslau .	370	8	Do. vols. 9, 10.
1830, 31, 32	Dr. Adelmann, Fulda .	170	7	Do. vol. 14.
1797 to 1837	Dr. Jansen, Ghent . .	13,365	341	Med. Gaz., March 6, 1840. Schmidt's Jahrbücher.

Thus among British practitioners we find 144 forceps cases in 52,268 cases of labour, or about 1 in 362¾.

Among the French, we have 277 forceps cases in 44,736 labour cases, or about 1 in 162.

And among the Germans, 1702 forceps cases in 261,224 labour cases, or about 1 in 153½.

If we add the whole together, we find 2,123 forceps cases in 358,228 cases of labour, or about 1 in 168½.

RESULTS OF THE OPERATION TO MOTHER AND CHILD.

Authors.	Number of Forceps Cases.	Mother Lost.	Children lost.
Dr. Smellie	52	2	9
Mr. Perfect	18	2	4
Dr. Jos. Clarke	14	2	Not stated.
Dr. Merriman	21	0	6
Dr. Granville	5	1	Not stated.
Dr. Ramsbotham	104	4	"
Edinburgh Lying-in Hospital	15	Not stated.	5
Dr. Maunsell	4	0	1
Dr. Beatty, sen.	111	0	0
Dr. Gooch	6	1	0
Dr. Ashwell	6	Not stated.	3
Mr. Warrington	1	0	0
Dr. R. Lee	42	3	31
Dr. Thos. Beatty	8	0	5
Dr. Churchill	9	0	0
Drs. Hardy and M'Clintock	18	5	8
Mad. Boivin	96	Not stated.	20
Mad. Lachapelle	79	14	23
Dr. Boer	19	2	5
Dr. Siebold	312	11	47
Dr. Ritgen	20	3	4
Dr. Andrée	8	1	4
Dr. Brunatti	23	1	6
Dr. Voigtel	3	0	0
Dr. Küstner	8	2	1
Dr. Adelmann	7	1	1

Now if we add together the number of forceps cases where the result to the mothers is stated, we shall find, that of those detailed by British practitioners, of 414 forceps cases, 20 mothers were lost, or 1 in 20½.

Amongst the French and Germans, in 479 cases, 35 mothers were lost, or about 1 in 13½.

Whilst of the children, the British statistics give 64 lost in 296 cases, or about 1 in 4½; and foreign statistics 111 in 575 cases, or about 1 in 5.

The total result is, that in 799 forceps cases, 54 mothers were lost, or about 1 in 15; and in 889 cases, 184 children were born dead, or about 1 in 5.

It will be admitted, I think, that these tables exhibit British practice in a very favourable light.

I am unable to explain the greater proportional frequency of operations in some of the German reports, except by supposing that their hospitals,

being on a small scale, are reserved for the worst cases met with in extern practice among the poor. Were I quite sure of this being the case, however, I should have omitted them from Table I, as they would then manifestly be an unfair record of the proportional frequency of the operation.

It would be unjust to compare the frequency of forceps cases among the Germans and British, without recollecting the minor degree of mortality amongst the children in the practice of the former, and the very much smaller number of crotchet cases. It would seem, that although the Germans use the forceps much more frequently than we do, they often thereby avoid a much more fatal operation.

The rate of mortality exhibited by the last table, is undoubtedly an over-estimate, as many of the deaths included in it were unconnected with the operation; but as this is not stated, except by a few authorities, though probably equally true of all, I have preferred quoting the numbers given, and appending this note.

It is greatly to be regretted, that the statistics of the result of the operation to the mother and child are so limited. Many writers who have carefully recorded the *number* of operations, have very carefully omitted to state whether the mother recovered, or the child was saved, leaving us to make the inference that both were saved. But we know that such an inference would be incorrect. Can any one believe, that whilst British practitioners lose one woman in twenty-one, Mad. Boivin and M. Baudelocque lost none at all?

I have, therefore, omitted or marked in the latter table, all those who have neglected to state the results.

535. If we fail in our endeavours to extract the infant with the forceps, we have no resource but to employ the perforator and crotchet, and, therefore, in estimating the *utility* of the forceps, we must also compare it with its *alternative* operation, inasmuch as every successful case of the former may be considered as so much gained from the latter.

Now, in craniotomy all the children are destroyed, and one in five of the mothers is lost; whereas we have seen, that by the forceps we save four out of five of the children, and nineteen out of twenty of the mothers. If we had more minute reports, the success would undoubtedly appear much greater.

536. The special *advantages* of the forceps are said to be:

1. That they are easily applied.

2. That their powers are calculated to attain the object for which they are used.

3. That they do this by imitating the natural powers.

4. That they aid the expulsive efforts of the uterus better than any other instrument, and supply their place, which no other instrument can.

5. That they are less liable to slip than the vectis.

6. That they are attended with less fatal consequences than the perforator and crotchet.

On the other hand, those writers who have defended the use of the vectis, as compared with the forceps, have enumerated several *disadvantages* of the latter—such as,

537. 1. The difficulty of their application in all cases, and in some, the impossibility of using them, owing to the position of the head or want of space.

That the introduction of two blades may be more difficult than that of one, in *certain* cases, is very evident, but that there is much greater difficulty in introducing the forceps than the vectis, in the majority of cases proper for its use, I do not believe. The latter part of the objection is of no force, because those cases where the introduction of the instrument is impracticable, are not cases in which its employment is contemplated, and, undoubtedly, when the impaction was so great as to prevent the application of the forceps, it would more surely render the vectis useless.

2. The risk of bruising the os uteri in the application of the forceps.

I do not think that there is much risk, if the operator be a competent person. Dilatation or dilatability of the os uteri being an essential condition of the operation, the supposition would involve great want of skill and care in the operator.

3. That when the forceps are applied, they are apt to slip and lose their hold.

This may sometimes happen, but it is much more likely to occur with the vectis.

4. That the pressure upon the child's head may destroy life.

No doubt; but as the pressure is regulated by the resistance, this ought never to happen, except in cases in which the crotchet must otherwise be used, and in which the vectis would be powerless.

5. That by adding to the volume of the head, they are apt to lacerate the perineum.

That the compression exercised upon the head of the child is amply sufficient to compensate for the additional bulk of the blades, there can be no doubt, even in those cases where the extraction is most easy; but we have an additional safeguard in the removal of one of the blades just before the head passes over the perineum.

6. That as they can never be used secretly, they have a tendency to alarm and intimidate the patient, and in this respect are inferior to the vectis.

When speaking of the vectis, I mentioned its secret employment, among its disadvantages; and I now quote this objection, for the purpose of entering once more my earnest protest against the employment of any instrument secretly.*

538. Having now given the history of the operation, stated its objects, and shown that they are attainable, from the nature of the aid afforded, and from numerical calculations; and having enumerated the positive and comparative advantages of the operation, with the objections that have at different times been made to the use of the instrument, I shall next proceed to mention the *cases to which the forceps has been considered applicable.* I would wish, however, that it should be remembered, that as I am not writing the history of my own experience only, but that of others, so I am not to be considered as necessarily the advocate of the forceps in all these cases. I have selected them from authors of the highest authority, and their evidence is altogether independent of support from me.

* The forceps and vectis are calculated for different cases. Under some circumstances one and under some the other is to be preferred. When the object is merely to change the position of the head, to facilitate its rotation, or to apply a very moderate degree of extractive force, the vectis answers very well; but whenever much traction is necessary, it is nearly useless. — EDITOR.

I must also premise, *that in no case is the forceps* (or indeed any instrument) *to be applied, until we are perfectly satisfied that the obstacle cannot be overcome by the natural powers, with safety to the mother and child.*

1. When the the head is unable to enter the brim of the pelvis from malposition (suppose with its long diameter corresponding to the antero-posterior diameter of the upper outlet), which is not rectified by the pains, the long forceps may be applied to change the position, provided the os uteri be fully dilatable, and that the change cannot be made by the hand alone.

2. When the head is in the upper outlet, fitting closely, but not impacted, and the pains are inadequate to overcome the resistance, a little help with the forceps, applied laterally (in relation to the pelvis), will often overcome the difficulty.

3. When the head, presenting at the brim, is somewhat too large for the antero-posterior diameter of the pelvis, if the excess be not more than may be remedied by the allowable degree of compression, the operation may be successful.

It will require some experience to ascertain this, before a trial, but as the alternative is the crotchet, it is surely worth while to make a cautious attempt with the forceps, from which no harm need result in case of failure.

In all these cases it will be necessary to use the long forceps; in the following, the shorter are sufficient, but of course either may be employed.

4. When the head is in the cavity of the pelvis, and is there detained by want of space, if the compression required for its extraction be not greater than the head of the child will bear with safety, the forceps may be safely used, either laterally, obliquely, or antero-posteriorly.

Siebold is said to have been able to reduce the transverse diameter of the head of the child six lines with Levret's forceps; Osiander, nearly an inch; Baudelocque, four and a half lines; Thouret and Velpeau, five or six lines; and Flamant, five and a half lines. Of course the amount will be in inverse proportion to the degree of ossification.

5. In face presentations, the longest diameters of the child's head are brought to bear upon the pelvis, adding greatly to the difficulty of its transit through the lower outlet, even when the pelvis is large, and still more, if it be under the average dimensions. In such cases, aid may often be given by the forceps, so as to save the child's life, and to mitigate the suffering and its consequences to the mother. It is not, however, to be assumed, that because the child descends faceling, that assistance will be necessary; the majority are delivered by the natural efforts.

6. The same observations apply to certain, though more rare cases, when the forehead is turned towards the symphysis pubis.

7. But the utility of the forceps is seen more clearly in those cases in which the pains, at first very strong, have gradually declined so as to be nearly or altogether powerless, but not from the resistance occasioned by a narrow pelvis. There may be sufficient space, the os uteri and external parts well dilated, and yet the labour does not advance. In such a case, the second stage cannot be very much prolonged without certain symptoms arising, indicative of danger to the mother; and here we are able

to relieve her without difficulty or risk, and to save the child (if it be alive at the time) by the timely use of the forceps.

In such cases (and every one must have met with them) I think I may say, that the operation adds absolutely nothing to the danger either to mother or child.

8. When the head or arm descends with the head, the additional bulk will require more expulsive force, and occasionally, aid must be afforded by the forceps.

9. In some cases of convulsions, hemorrhage, and rupture of the uterus, where the head is within reach, the forceps are found extremely useful in expediting the delivery.

10. In certain cases of breech presentation, it is very difficult to extract the head after the body is expelled, either from malposition, or from the incompressibility of the base of the skull; in these cases the difficulty may be removed or overcome by the forceps.

11. The forceps may be used after the vaginal hysterotomy or symphyseotomy.

12. In prolapse of the funis, when it is an object to hasten the labour, in order to save the child. The pulsation of the cord will show whether the operation affords a chance.

539. These are, I believe, all the cases in which the forceps have been used or recommended by high authority; to complete the subject, I may mention certain cases in which they ought not to be employed.

1. In distortion of the pelvis, or when its calibre is diminished from any cause, such as tumours, exostosis, &c., if the narrowing of the pelvis be too great to admit of the passage of the child's head, when moderately compressed; such cases can only be terminated by the perforator.

2. When the os uteri is rigid and undilatable, or when the passages are much inflamed and swollen, the forceps ought not to be used.

3. In some cases, where the patient has been mismanaged, and allowed to remain too long, the system is in such a state that we are obliged to have recourse to the most expeditious mode of delivery. In these cases (especially if there be a doubt of success with the forceps) it may be wiser to have recourse to the perforator. But such cases could scarcely happen under the care of a well-educated practitioner, nor are they at all frequent.

4. If the child be dead, we are advised to prefer craniotomy. If we are quite certain that the child is dead, the principal objection against craniotomy is removed; but this it is not always easy to determine. The stethoscope is a most valuable source of information; but it must be remembered, that while its positive evidence is unquestionable, the negative evidence (*i. e.* no sign being audible) is not equally conclusive.

Dr. Collins, whose experience has been very extensive, remarks: "I know of no case where the advantage derived from the use of the stethoscope is more fully demonstrated, than in the information it enables us to arrive at, with regard to the life or death of the fœtus, in the progress of tedious and difficult labours."

540. We next come to consider the *period for operating*. "It is one of the nicest points in practice, correctly to decide, whether any given case of protracted labour may be trusted with safety to the further exertions of the natural agents, or whether the means of art ought to be promptly brought to their assistance. In determining this important

question, the whole of the symptoms are to be collectively and severally considered, and their different tendencies accurately examined, that we may equally escape the imputation of haste and indiscretion on the one hand, and of delay and indecision on the other; yet, let us ever bear in mind, that more injury may possibly accrue from too long delay, than arise from premature assistance."*

The decision of this point must, in a great measure, be left to the judgment and experience of the practitioner. No very definite rule can be laid down: we find both individuals and nations differing upon the subject; the Germans operate more frequently, and at an earlier period than the British, but on the other hand, they have fewer crotchet cases.

In forming our decision, there are several points for consideration:

1. The local circumstances of the case, such as the position of the head, space in the pelvis, complications, &c.; these constitute the principal grounds of necessity for the operation, and have been enumerated.

2. The general condition of the patient, and the presence or absence of the symptoms of a prolonged second stage; if present, their amount, urgency, rapidity of development, &c.

Our great object in the use of the forceps, is to anticipate these formidable symptoms, and to rescue the patient from the danger. I think then, that as regards the mother, we may conclude:

1. That as these formidable symptoms are not consequent upon a prolonged first stage; therefore, before the completion of the first stage of a labour, that is, before the os uteri is perfectly dilated, and the membranes broken, the use of the forceps cannot properly come into contemplation. But I would remark, that when the obstacle is at the upper outlet, the second stage virtually commences when the os uteri is fully dilatable, as the head *cannot* pass through it, and the usual symptoms may arise if the labour be sufficiently prolonged.

2. That when the second stage has lasted so long, as to prove the inadequacy of the natural powers, or at all events, as soon as the symptoms of a prolonged second stage make their appearance (quick pulse, dry tongue, fever, &c.), then we ought promptly to interfere. "A practical rule has been formed, that the head of the child shall have rested for six hours as low as the perineum, that is, in a situation which would allow of their application, before the forceps are applied, though the pains should have altogether ceased during that time."

The symptoms, however, are a surer guide than the duration of the labour merely; some patients will show more signs of suffering after six hours, than others after twelve or sixteen. Dr. Collins observes: "Let it be carefully recollected, at the same time, that so long as the head advances ever so slowly, the patient's pulse continues good, the abdomen free from pain on pressure, and no obstruction to the removal of the urine, interference should not be attempted, unless the *child be dead*."

At the same time, as we know that after a certain duration of the second stage, these unpleasant symptoms do arise, the length of the labour cannot be altogether omitted in our estimate of the case, and is a reason for great vigilance.

3. We must not omit the consideration of the life of the child; after

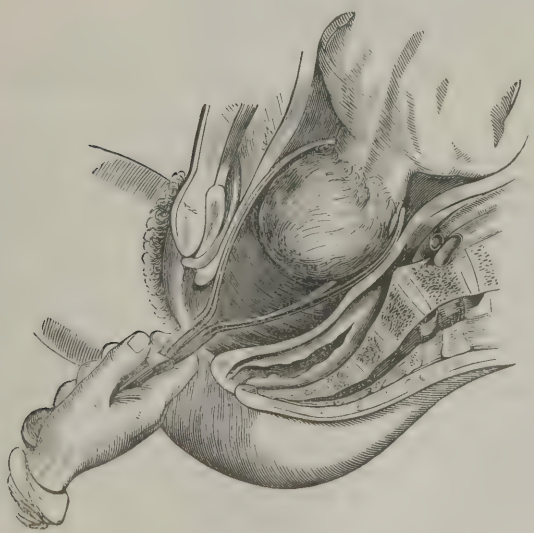
* Ramsbotham's Practical Observations on Midwifery, vol. i. p. 256.

the child, and it may even die before the symptoms on the part of the mother become very formidable, though this is not always the case. This condition may sometimes be detected by the stethoscope, the action of the heart becoming feeble and irregular. In such a case, if no counter-indication existed, we should be justified in interfering for the purpose of saving the child's life, provided the operation were practicable.

541. Method of operating. — When once we have determined upon the propriety of operating, the operation itself is not very difficult; it requires a thorough *tactile* knowledge of the pelvis, some manual dexterity and steadiness. I shall first describe the application of the long forceps at the brim, and then (the long or short forceps) in the cavity of the pelvis.

I. *The long forceps.* — These may be applied either in the transverse or antero-posterior diameter of the pelvis. If our object be compression, or a change of the position, the antero-posterior diameter will be the best; but if additional force be required, they may be applied transversely (*i. e.* over the occiput and forehead of the child). In this position, as there is more space, their application is more easy; but it must be remembered, that in proportion to the grasp we take of the head in its longitudinal diameter, we diminish that diameter, but increase the transverse, and so may add to the difficulty of the descent of the head. Therefore, only sufficient force should be used to enable us to extract.

Fig. 100.



"When about to apply the long forceps, it is to be remembered that the difficulty exists at the brim of the pelvis, that the antero-posterior diameter, or that from the symphysis pubis to the promontory of the sacrum, is diminished; in the application of the instruments, therefore, care should

the second stage has lasted a certain time, there is considerable risk to be taken that they be placed over the head, in such a situation that they may occupy the most roomy part of the pelvis, which will be its lateral diameter. In a natural presentation and situation, one blade of the instrument will consequently be placed over the forehead, the other over the occiput."*

The patient is to be placed on her left side (or on her back), close to the edge of the bed; the forceps, warmed and oiled, are to be within reach, and the operator should introduce two or three fingers of his left hand, or his whole hand, during an interval of pain, along the head of the child within the os uteri, for the purpose of protecting it, and guiding the blade of the forceps.

The upper or anterior blade is then to be passed along the inside of the fingers or hand, in the axis of the upper outlet, until it glides over the part of the head to which we wish to apply it. It is then to be retained "*in situ*" by an assistant, and the hand or fingers withdrawn; the right hand (or two fingers) is next to be introduced on the opposite side, and the second blade passed carefully up, and applied to the head. If the blades have been properly placed, they will lock; but if not, one must be withdrawn and re-introduced. When locked, the handles may be tied together or grasped firmly, and the extracting force applied, of which I shall speak presently.

The most important points to remember in the application of the long forceps are:

1. To guard the os uteri with one hand.
2. To introduce the upper or anterior blade first.
3. To pass the blades in the axis of the upper outlet.
4. To regulate the force of the grasp, according to the circumstances of the case.

542. II. *The short forceps.*—These may be passed in accordance with the transverse, oblique, or antero-posterior diameters of the pelvis. In many cases where it would be impossible to pass them laterally, we may succeed in passing them antero-posteriorly, and in extracting the child; but we must bear in mind the observation made when speaking of the long forceps, that the pressure in the long diameter of the child's head (*i. e.* when the forceps are introduced obliquely or antero-posteriorly) increases its lateral or transverse diameter, and so far augments the difficulty of its extraction.

The bladder and rectum should be evacuated before the attempt is made, and the forceps warmed and oiled, as already mentioned. The patient is then to be placed near the edge of the bed, and after a careful examination, our decision formed as to the part to which the instrument is to be applied. One or two fingers are then to be introduced into the vagina, during an interval of pain, to guide the forceps and protect the soft parts.

"The forceps must be introduced, one blade after another, first introducing the fingers of each hand to carefully guard the bows past the os uteri, and fairly over the side of the head, for should the os uteri get be-

* Waller's edition of Denman, p. 279, note.

tween the head and forceps, it would at once prevent any firm hold of the head, and you consequently fail in the attempt, and also bruise the part that intervenes, so as to endanger an excoriation and great inflammation."*

We must always be careful that "the point of the instrument be constantly kept in contact with the head; to effect which, it will be necessary to remember, that the child's head is in every part convex, and, therefore, as the instrument advances, the handle must be raised, or otherwise in its progress it may pass on, instead of going under, the os uteri, if any part should remain in contact with the child's head."†

Fig. 101.

The forceps must be introduced at first in the axis of the lower outlet, but this direction must be almost immediately changed into that of the upper outlet, or there will be danger of wounding the posterior wall of the vagina. The upper or anterior blade should be introduced first, and then the lower or posterior one. When both are applied, they ought to be opposite, and if so, will easily lock, but "if, on endeavouring to lock the forceps, it should be found that they do not readily come together, they have not been properly introduced; no force or violence should be used to bring them together, but the second blade should be withdrawn, and introduced afresh."‡

Great care must also be taken, that the soft parts, or hair, are not included in the lock, as this will give great pain. The lower part of the handles may be tied together by a ligature, so as to determine the force of the grasp, which has this advantage, that it fixes the degree of compression, and leaves the operator at liberty to occupy himself with the extraction only. If, however, the head fit tightly, and more compression than merely

* Pugh, Treatise on Midwifery, 1754, p. 83.

† Osborn, Essays on Parturition, p. 99.

‡ Merriman, Synopsis of Difficult Parturition, p. 197.

that which is sufficient for extraction be necessary, it will be useless; the operator must then regulate the compression with his hand, and extract at the same time.

"When the forceps are first locked, they are placed far backward, with the lock close to, or just within the internal surface of the perineum; and they can have no support backwards except the very little which is afforded by the soft parts. The first action with them should therefore be made, by bringing the handles, grasped firmly in one or both hands to prevent the instrument from playing upon the head of the child, slowly towards the pubes, till they come to a full rest. Having waited a short interval with them in this situation, the handles must be carried back in the same slow but steady manner to the perineum, exerting, as they are carried in the different directions, a certain degree of extracting force; and after waiting another interval, they are again to be raised towards the pubes, according to the situation of the handles."*

We must remember, "that the force employed in extracting the head be always and steadily from blade to blade, but with intervals resembling the labour pains, and constantly in the direction of the axis of the pelvis, till the occiput begins to emerge from under the arch of the pubis, when the handles are to be raised over the symphysis pubis with the right hand, while the left is applied to strengthen and preserve the perineum."†

"The whole power or force which the instrument enables us to use, ought not to be exerted in the first instance, but such a degree as any individual case may require, which can only be known by first trying a moderate degree of force, increasing it slowly and deliberately, according to the exigence of each case."‡

When we thus employ the power we possess gradually, steadily, at intervals, and in the direction of the axes of the pelvis, we must not forget the danger (in some cases at least) from pressure or contusion. Our guide in this matter is the pulse, which rapidly rises if injury be inflicted.

"If the pulse be 120 or 130 before you commence operations, it is clear that you cannot, from counting the beats, take an intimation whether the soft parts have or have not sustained injury; but if, before the forceps be applied, the pulse is under 100 in the minute, then should contusion be produced by your efforts with the instrument, the rise of the pulse will indicate it. After every effort with the forceps, therefore, count, waiting two or three minutes, so as to allow the beats to subside after muscular exertion, and count completely round the circle. If you find it below 100, no serious injury has been inflicted; if the frequency is increasing, although it do not necessarily follow that serious injury has been inflicted, yet the existence of contusion becomes probable, and further efforts must not be made without much further consideration."§

When our efforts have been so far successful, that the occiput emerges from the lower outlet, if there be pains, it is better to remove one blade (the posterior one, when they are applied antero-posteriorly) of the forceps, to lessen the risk of laceration, and the perineum should be carefully

* Denman's Introduction, p. 281.

† Osborn, Essays on Parturition, p. 100.

‡ Denman's Introduction, p. 280.

§ Blundell's Principles and Practice of Obstetricy, p. 505.

supported by an assistant, whilst the operator uses the other blade as a tractor if necessary.

If the head be high up in the pelvis, we must take care that the usual half-turn be made as it descends, so as to bring the face into the hollow of the sacrum.

In breech cases, when the head is detained, the operation is not very different; the blades are to be passed up antero-posteriorly, or laterally, and locked across the chin, or back of the head, and the extracting force applied, gently, firmly, and at intervals, not forgetting the natural turns, so as to bring the face into the hollow of the sacrum, if possible.

543. *Difficulties.* — "The difficulty of applying the forceps," says Dr. Denman, "is most frequently occasioned by attempting to apply them too soon; or passing them in a wrong direction; or by entangling the soft parts of the mother between the instrument and the head of the child, against all which accidents we are to be on our guard."

1. The first difficulty we meet with is in the introduction of the blades. There may not be space enough, and if we find this to be the case, after a fair and careful trial, we are not to persist at the risk of injury to the mother, but craniotomy must be performed.

When the head is pressed down against the tuberosities of the ischia, there may be some difficulty in passing the blades between them, and if the head cannot be raised up during an interval of pain, the forceps had better be applied antero-posteriorly, or both blades being introduced posteriorly, we may gradually slip them to either side.

I do not speak of the difficulty of applying the forceps when the os uteri is rigid, because it should never be attempted.

2. As I have already mentioned, there may be some difficulty in locking the blades, and then one of them must be withdrawn and re-introduced. It is quite possible to deliver the child without locking the blades, but there is more chance of injury, and the instrument is more apt to slip.

3. The extraction may be difficult or even impossible. The great value of experience in such cases is, that it teaches us how far we may carry our efforts without injury. Perhaps a little more compression or a little more force may crown our efforts with success, provided that it do not exceed safe limits. But great care and caution will be necessary, and if we find our efforts fruitless after a fair trial, we shall then be justified in having recourse to the perforator, nor will the patient be the worse for the failure with the forceps, if the attempt have been judiciously made.

544. The principal *dangers to the mother* are:

1. In the introduction of the blades, if it be not effected in the axis of the upper outlet, the vaginal parietes may be lacerated, and if the cervix uteri be not guarded by the hand, the blade may be pushed through it, or it may be included between the end of the blade and the child's head. Cases of mal-practice illustrative of these dangers might easily be quoted, but it is sufficient for my purpose to allude to them as a caution.

2. The soft parts in the pelvis may be bruised or lacerated in the extraction.

3. The perineum may be lacerated.

The *dangers to the child* arise:

1. From want of care in introducing the blades, by which the scalp may be bruised or torn, or an ear cut off.

2. From excessive compression, by which the skull may be indented, the bones fractured, or death from pressure induced.

Dr. Blundell has given a distressing picture of the accidents which may result from an incautious or maladroit use of the forceps.

"The grand error you are apt to commit in using the long forceps, is force. In violent hands, the long forceps is a tremendous instrument; force kills the child, force bruises the softer parts, force occasions mortification, force breaks open the neck of the bladder, force crushes the nerves; beware of force, therefore, *arte non vi*. Other errors, too, there are, against which I beseech you to guard. You may use the forceps without heed; you may try to use it when the parts are rigid, and the os uteri not fully expanded; you may attempt to apply it, without knowing the position of the head; you may oscillate the instrument too extensively from side to side; you may draw without intermission, instead of imitating the pains; you may close the handles too forcibly by the hand or ligature; you may hurry the head through the outlet; you may neglect to throw the face towards the sacrum; you may forget the perineum; you may fail to conduct the head, when it emerges, towards the abdomen and the mons, by drawing it too much upon the perineum."

545. *After-treatment.*—The first symptom which will require our attention, is the shock caused by the operation. If it be great, a combination of opium with ammonia will be found the best remedy, with wine and water in moderate quantity. If it be not severe, perfect quiet will be sufficient, and the subsequent management is the same as after ordinary delivery, with increased caution, however, and daily attention to the state of the vagina. If there be any soreness or inflammation, warm water injections should be used twice a day.*

* Although Dr. Churchill avows his preference for "the long or short forceps with the single curve," &c., he appears in reality not to be at all tenacious on the subject of its construction. "The hand," he remarks, "that is to use the instrument is, however, of more importance than the instrument itself, of which it may be observed with truth, that 'that which is best administered is best.'" In this expression, I conceive, he inculcates a great error.

A prudent and well-qualified operator, it is true, will not do *harm* with a *bad* instrument, but he may be unable to accomplish any good purpose with it, in cases where one better adapted would render him successful.

"I have repeatedly," says Dr. Huston, in a note to a former edition, "seen gentlemen of large experience in the art, completely foiled in attempting to grasp the head at the upper strait, with a forceps having only the single curve, although when an instrument differently constructed was placed in their hands they accomplished it very readily; and I have myself delivered, successfully for both mother and child, under the same circumstances, with a long double-curved forceps, after others had failed with those without the second curve, or of insufficient length."

If the use of the forceps is to be confined to cases in which the head has descended into the cavity of the pelvis, resting on the perineum or protruding at the os externum vaginæ, then, indeed, "the hand that is to use the instrument is of more importance than the instrument itself;" nor is it of much importance what *hand* it is, if guided by the common feelings of humanity, so simple and easy is the operation. But when it is important to hasten the delivery while the head remains above the upper strait, or is still engaged in it, as in convulsions, hemorrhage, some cases of prolapse of the funis, aneurism, inability of the woman, in consequence of feebleness, to sustain longer the natural parturient efforts, or from contraction of the brim in a degree not so great as to demand the perforator — in such cases the kind of instrument we employ is of the greatest importance. The blades must be adapted to the head of the child, the shape

must correspond with the axes of the pelvis, and the handles must be long enough to allow of the operator obtaining a secure hold outside and free of the vulva, or success is not to be expected at the hands of the most dexterous obstetrician. British practitioners, I am aware, seldom employ the forceps under the circumstances I have mentioned. In this I think they are wrong, — they differ, certainly, from the practitioners of this country and of Continental Europe.

"In England," says Dr. Robert Lee, "there are few practitioners of judgment and experience, who have frequent recourse to the forceps, or who employ it before the orifice of the uterus is fully dilated, *and the head of the child has descended so low into the pelvis, that an ear can be felt*," &c.* According to this rule, every case in which the unaided powers of the woman fail to make the head "descend so low into the pelvis that an ear can be felt," calls for the perforator! The fruits of this practice may be learned from the following table, furnished by the same author. No one can fail to be struck with the disparity in the practice of British, compared with that of the Continental practitioners.

A Comparative View of the Frequency of Forceps and Craniotomy Cases in eleven Lying-in Hospitals.

Hospitals.	No. of Labours.	Forceps Cases.	Proportions.	Craniotomy Cases.	Proportions.
Dublin, Clarke . . .	10,199	14	1 in 728	49	1 in 248
Do. Collins . . .	16,654	27	1 in 617	118	1 in 141
Paris, Baudelocque . .	17,388	31	1 in 561	6	1 in 2898
Do. Lachapelle . . .	22,243	76	1 in 293	12	1 in 1854
Do. Boivin	20,517	96	1 in 214	16	1 in 1282
Vienna, Boer	9,589	35	1 in 274	13	1 in 737
Heidelberg, Naegelè . .	1,711	55	1 in 31	1	1 in 1711
Berlin, Klugè	1,111	68	1 in 16	6	1 in 185
Dresden, Carus . . .	2,549	184	1 in 14	9	1 in 283
Berlin, Siebold . . .	2,093	300	1 in 7	1	1 in 2093

From this table it will be seen that those who relied most on the forceps, had the fewest occasions to resort to craniotomy, and vice versâ. Of the extreme cases on each side, it will be observed that Dr. Collins, whilst he employed the forceps but once in 617 cases, resorted to craniotomy once in 141 cases; or nearly four and a half times as often as the forceps. Dr. Siebold, of Berlin, had recourse to the forceps once in every seven cases, and craniotomy but once in 2093 cases! It is not difficult to imagine on which side was the greatest mortality. Whence arises this prodigious difference? Unquestionably from the different principles by which the practitioners of these countries are guided. As properly observed by Dr. Lee, 'if we compare the reports of the principal Lying-in Hospitals of Great Britain, France, and Germany, and examine the doctrines inculcated by the best systematic writers of these countries, it is impossible to avoid being struck with the want of uniformity which prevails in all that relates to the operations of midwifery. Although the cases of difficult parturition must be nearly the same in every part of Europe, cases of instrumental delivery are far more numerous in some countries and institutions than in others, and the method of operating is widely different.'

To the practitioners of this country, the reports of the English Lying-in Hospitals are surprising, especially when it is considered that they are under the supervision of men of the most exalted standing in the profession. The frequency with which many of the Germans employ the forceps is in strong contrast with British practice, and perhaps scarcely more rational.

In the United States, so much looseness and neglect prevails in regard to obstetrical statistics, that it is not easy to arrive at exact results; but there can be no question that while the forceps is far more frequently employed than by the English, it is much more rarely resorted to than by the practitioners of Northern Europe.

The frequent occasion which English practitioners find for the performance of craniotomy appears to proceed from the rules by which they are governed in regard to the use of the forceps, and which limit its application to a comparatively small number of

* Clinical Midwifery, by Robert Lee, M. D., &c., page 1.

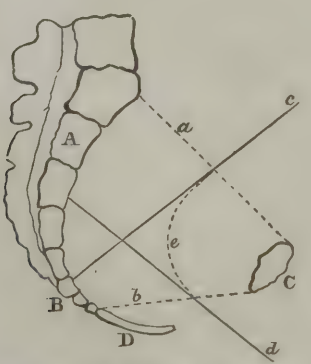
cases. Whether these rules are deduced from a consideration of the mechanical properties of the instruments they employ, or whether the instruments are constructed in reference to the objects contemplated by the rules, they certainly concur in restricting the use of this means of relief within much narrower limits than either Continental or American practitioners deem necessary or proper. That the forceps commonly employed by our English brethren, whether long or short, are capable of accomplishing the objects which their rules contemplate, is hardly to be denied; almost any form of instrument of the kind ever invented, however rude, in competent hands, will prove sufficient. But have we not instruments of better construction, of greater mechanical powers, and capable of being successfully employed under a wider range of circumstances than are embraced in the canons of English obstetricy?

The sufficiency of the English or any other forceps for the management of cases where the head of the child has passed through the upper strait is admitted; but are they equally capable of useful application before matters have advanced thus far? It is believed that they are not. The application of the various short forceps, when the head of the child has not passed through the upper strait, seems to be out of the question. The distance which it is necessary to pass them within the pelvis, and the almost impossibility of obtaining a secure hold of the head with so short an instrument, render them valueless. The only exception, if there be any at all, is the forceps of Dr. Davis. A very serious objection, however, to this instrument is that which is common to all of its class,—the blades are so short that, when introduced sufficiently far to embrace the head in the upper strait, the lock is brought within the vulva. This, beside the danger of injury to the parts, leaves to the operator a very insufficient hold of the handles for efficient action. The great width of the blades, too, is objectionable, as Dr. Davis himself has found and endeavoured to obviate by the occasional use of *one blade* made very narrow.

These objections are made, however, with much deference, not only from the high character sustained by the eminent inventor, but because it is the instrument preferred by the able Professor of Midwifery in Jefferson College, Dr. Charles D. Meigs.

Our author prefers "the long or short forceps, with the single curve." There is certainly no advantage in the second curve to the *short* forceps: these being only adapted to cases in which the head has descended into the cavity of the pelvis, when there is but one strait to pass, an instrument which corresponds in form with the axis of that one strait, is of course all that is required. But it is widely different when the head is to be delivered from the upper strait. It must be borne in mind that the axes of the two straits run in very different directions — that of the upper strait being downward and *backward*, and of the lower, downward and *forward*. Now in order to embrace the head in the upper strait, the instrument must pass through the outlet in the axis of the lower strait, or nearly so; and consequently, it must have a form corresponding, in a considerable degree, with the curved line running through the axes of both straits, otherwise there will be excessive pressure made upon the perineum by the instrument, and extreme difficulty in adjusting it properly on the head of the child.

Fig. 102.

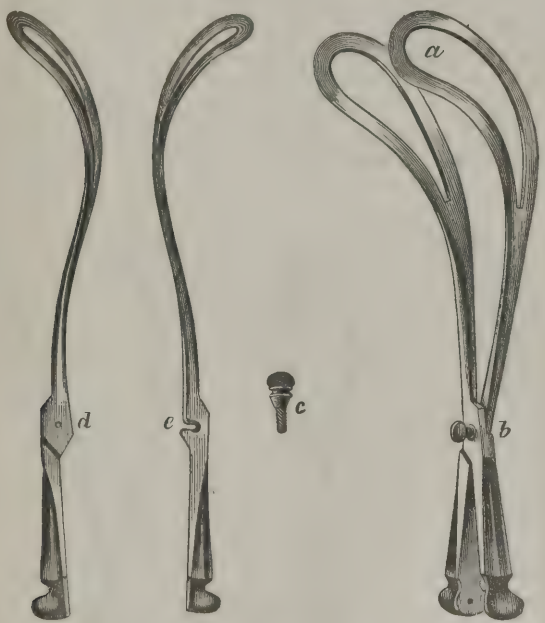


A glance at the accompanying cut will exhibit this better than any verbal description. A. The sacrum. B. The coccyx. C. The pubis. D. The perineum. Dotted line *a*, plane

of the upper strait; dotted line *b*, plane of the lower strait; *c*, imaginary line passing from the umbilicus to the upper part of the coccyx, and through the centre of the upper strait or its *axis*; *d*, a similar line, extending from the middle of the sacrum through the os externum vaginæ, and marking the axis of the lower strait. The curved dotted line between these straight lines, shows the course the head of the child must take in passing through the pelvis, and which must necessarily be traversed by the forceps when applied at the superior strait.

The extreme difficulty, not to say failures, which Dr. Huston, of Philadelphia, experienced in operating with the short forceps and those of single curve, under the circumstances we are considering, induced him many years ago to attempt to supply what seemed to him a great deficiency in the various forceps in common use. While engaged in this task, the late Dr. Eberle placed in his hands the forceps of Professor Siebold. "I saw at once," he remarks in a note to a former edition, "that it possessed many advantages over any others that I had seen, and that with some little alterations it would accomplish the objects I had in view. The instrument of Siebold, thus modified according to my own views, I now present to the public, after nearly twenty years of trial, and sanctioned too by the experience of a number of my friends. An account of it has never before been published, but it was exhibited several years ago to the College of Physicians and the Philadelphia Medical Society, and subsequently it has been referred to by Professor Meigs in his Philadelphia Practice of Midwifery. The annexed engravings (Fig. 103) represent the instrument and its several parts, as made for me by Weigand and Snowden of this city, pretty accurately.

Fig. 103.



"Width of the blade at *a*, one inch and five-eighths; of the fenestra, one inch; separation of the blades at the widest part when properly locked, two inches and a half (but this is increased nearly a quarter of an inch by the manner in which the blades are ground, being concave on their inner face, and convex externally: by this arrangement the liability of the instrument to slip off the head is lessened); length of the blades to the lock at *b*, nine inches; length of the handles from the joint at *b*, five inches. The lock, which is exactly like that of the German instrument, is formed by a thumb-screw, *c*, which is fastened into the male branch at *d*, and is received into a mortise in the female branch at *e*. This mortise is countersunk, so that when the screw or pivot is screwed down completely, the blades cannot be separated.

"By the kindness of Dr. Mœhring, a former pupil of Siebold, I have before me the instrument of that distinguished professor, made by 'Windler, of Berlin,' and which may therefore be regarded as accurate. On comparing mine with it I find them to differ as follows:

"Although the instruments are of the same length, the blades of mine are an inch longer than those of Siebold, and the handles, from the pivot, correspondingly shorter. This brings the lock more completely free from the vulva when operating at or above the upper strait; at the same time, the shaft, or narrow part of the blade beyond the pivot, constitutes in fact part of the handle equally effective with the handle proper. The *fenestra* of the blade is nearly double the width of that of the German instrument, and the sweep of the second curve an inch and a quarter greater.

"The instrument is also four ounces lighter than the Berlin-made forceps.

"The objects gained by these modifications are:

"1. The blades being longer, as stated, the soft parts of the woman cannot be entangled with the lock.

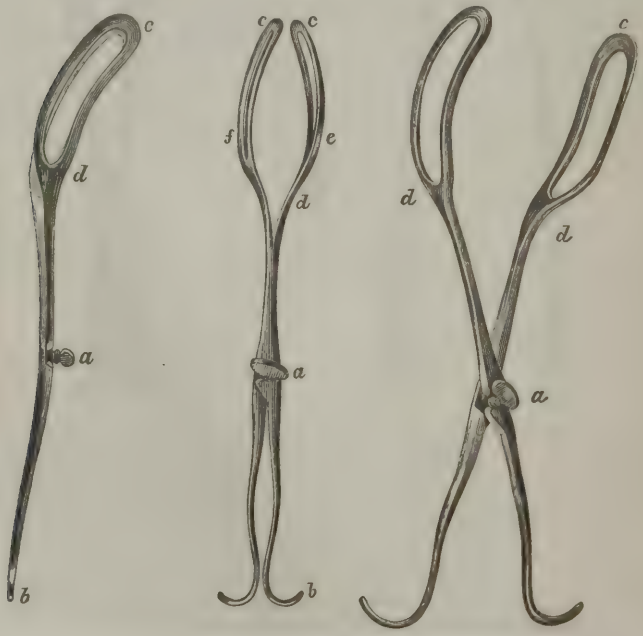
"2. The increased width of the fenestræ avoids adding the thickness of the instrument to that of the head, renders it less liable to slip off, and lessens its weight.

"3. But the most important modification is in the increase of the second or pelvic curve, by which the blades correspond better with the form of the pelvis, so that when their extremities are in the axis of the upper strait, their shafts pass directly through the axis of the outlet. By this arrangement, the instrument is more readily applied when the head is high up, and all undue pressure on the perineum is avoided. This form of the instrument also enables the operator to apply it when the patient is on her back on a mattrass, without bringing her down so low as to have her limbs off the bed, which adds much to the comfort of the patient and the decency of the operation.

"From this description of the instrument it will be understood that it is calculated, in every case, to be passed along the *sides* of the pelvis."

The following figures represent the forceps invented by Dr. Hodge, of the University of Pennsylvania. It is calculated, in a considerable degree, to accomplish the same objects as the one employed by Dr. Huston. The eclectic forceps, as Dr. Hodge calls his instrument, weighs one pound and one ounce; being nine ounces lighter than the French forceps, as usually manufactured by Mr. Rorer of this city, and eleven ounces lighter than a specimen of Dubois' forceps, made in Paris.

Fig. 104.



"The whole length of the instrument in a direct line from *b* to *c* is 16 inches. From the joint *a* to extremity *b*, the length of the handles is 6·8. From *a* to *c c*, extremities of the blades is 9·5, in a direct line. From *a* to *d*, length of parallel shanks is 3·5. From *d* to *c*, the proper blades, in a direct line, is 6 inches. From *c c*, the extremities, to *e f*, the greatest breadth, 3·7 inches.

"The separation between the points *c c*, when the handles are in contact, is ·5 of an inch. From *e* to *f*, the greatest breadth when the handles touch, is 2·5; when the separation at *e f* is 3·5, the points *c c* are separated to 2 inches.

"The breadth of the blade is 1·8, slightly tapering to 1·7 near *c c*, the extremities. The breadth of the fenestra is 1·1; the thickness of the blade is ·2 of an inch.

"The perpendicular elevation of the points *c c*, when the instrument is on a horizontal surface, is 3·4 inches, which indicates the degree of curvature of the blades.

"The elevation of the handles near the joint, above the same horizontal line, is 1·3 (including the thickness of the blades), which indicates the extent of the angular bend in the handles."

An important modification of the forceps has been recently announced by Dr. Bond, of Philadelphia (*American Journ. of the Med. Sciences; Oct.*, 1850).

At an early period of his professional life it occurred to him that obstetrical cases are sometimes, although not very frequently, met with where, owing to the position or the form of the fœtal head, and its relation to the pelvis, it is found impracticable to adapt the clams to the head so as to lock the branches, or to do so without violent injury to the mother or child.

Dr. Blundell very justly observes, "Unless the blades be elastic, absolute adaptation can (I conceive) never be obtained; for while the form of the instrument remains unchanged, that of the head itself varies." "The lock should be loose, so as to admit of a junction of the blades, although they may not be brought into exact apposition with each other; for, in applying them to the head, this adaptation cannot always be obtained." For this reason, he says that Smellie's lock (made loose) is decidedly the best.

Dr. Meigs says, "If we fail to adjust the branches accurately in apposition, we either cannot make them lock, or we lock them in such a way that the edge of the instrument contuses, or even cuts the part of the scalp or cheek on which it rests, leaving a scar, or actually breaking the tender bones of the cranium, while the other edge cuts the womb or vagina by its free projecting edge. In fact, the forceps is designed for the sides of the head; and if, under the stress of circumstances, we are compelled to fix them in any other position, (an incident not very unfrequent), we shall always feel reluctant to do so, and look forward with painful anxiety to the birth, in order to learn whether we have done the mischief we feared, but which we could not avoid." *

"The difficulty and the danger in such cases," remarks Dr. Bond, "evidently arise, to a great extent, from the want of an accommodating, rocking motion of the branches of the forceps upon each other, such as will allow the depressed ('cutting and contusing') edge to rise, and the elevated edge to sink and come in contact and apposition with the head; that is, so that the blades may be adapted to the head by varying from their usual relation to each other.

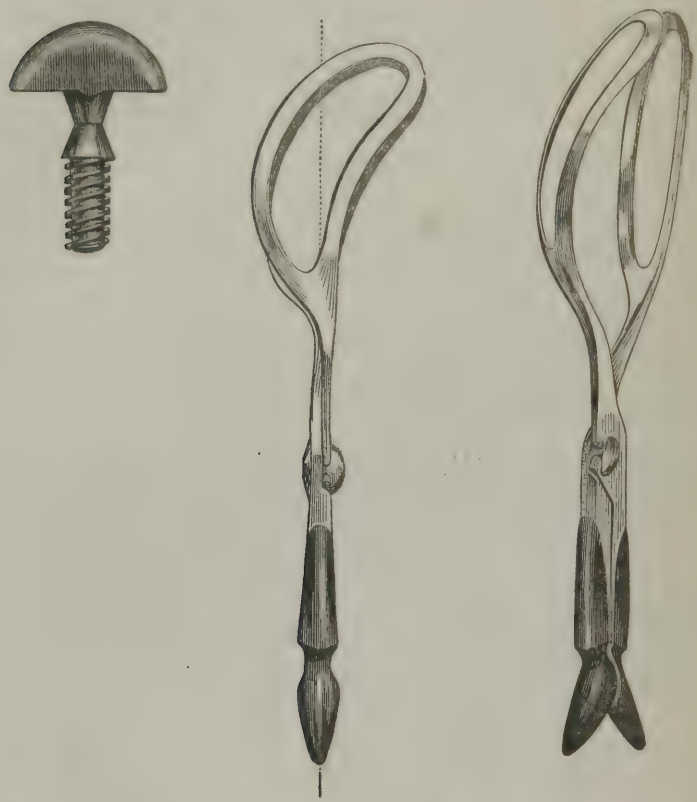
"None of the French forceps, or their numerous modifications, so far as I know, are intended to admit of such a motion. When locked, they are truly locked; and whatever be the form of the head, or whatever the parts of the head to which the instrument is applied, the head must conform to the forceps and not the forceps to the head. Smellie's joint (which can hardly be called a lock) will admit of some motion, if made loose, as recommended by Dr. Blundell; but this motion is very limited and unregulated. Dr. Davis, of London, has adopted Smellie's joint, but without observing Dr. Blundell's precaution as to its looseness. The lock of Dr. Siebold's forceps, when the pivot is partly unscrewed, will admit of the lateral motion of one branch upon the other, to a very considerable extent. The branches of forceps are two levers of the first kind, the pivot being the common fulcrum of each. It is to be observed in Siebold's forceps, that the branches are so much curved—make so wide a sweep—that the fulcrum is far removed from the direct line between the power (the hand) and the weight (the head); and it will be seen on examination that this circumstance will render their lateral or rocking motion nearly useless, if not dangerous. Indeed, I should infer, from the structure of the joint and the form of the blades, that the use of this motion was never contemplated by the inventor."

---

* See "*Obstetrics; the Science and the Art*," chap. xv., for much information and excellent lessons on the use of the forceps. I commend attention to the author's emphatic inculcation of the idea, that "*the forceps is the child's instrument.*"

"In the instrument,* which is illustrated in figs. 105, 106, 107, I have attempted to supply what has seemed to me an obvious *desideratum*, viz. *to give the branches of the forceps an accommodating rocking motion upon each other, the extent of which can be regulated at will, and which shall in no respect lessen the power of the instrument.* The mechanism devised to obtain this motion is very simple, not liable to derangement, and it may

Fig. 105. Fig. 106. Fig. 107.



be adopted in the construction of forceps of other forms than that here presented; provided that the pelvic curvature of the branches does not take such a wide sweep, as to throw the pivot far out of the direct line between the handle and the centre of the fenestræ.

"The instrument will be seen to differ, as a whole, from any now in use; although no one of its modifications, except the lock, has any claim to novelty. The handles are Dr. Siebold's, with unimportant modifications. The blades are Dr. Davis's, a little modified. Its whole length is about fifteen inches, and its weight about fifteen ounces. The length of the handle is six inches, and that of the blade nine inches. It might be made somewhat shorter and lighter without impairing its power.

"In fig. 105 (the pivot of full size), the *screw* is of about double the diameter and nearly double the length of those in other instruments. This *additional strength* is necessary, because the bearing point of the pivot is not immediately above the blade in which it is inserted (as in other instruments), especially when this bearing point is elevated so as to give the blades a free rocking motion. The *additional length* is

* "The instrument, from the manufactory of Messrs. John Rorer & Sons, of Philadelphia, is made of German steel, and spring-tempered."

required to give the screw a firm lodgment, when it is partly withdrawn from the blade. The *thumb-piece* is made to fit so close upon the female blade, but without resting upon it, and is so thick and rounded, that there may be no risk of injury should it ever happen to be brought into contact with the patient. The screw, when well made, will turn so easily that the thumb-piece may be made much less prominent than it is here represented. When the forceps is used, the thumb-piece should be placed *parallel with the blades;* otherwise it may interfere with the rocking motion. Between the thumb-piece and the screw, the pivot is of the form of two *frusta* of cones of equal dimensions, united together at their smaller diameters, forming an obtuse angle or groove at their junction. The base of that cone joined to the screw projects a little, forming a shoulder, intended to limit the motion of the screw into the blade.

"The notch in the female blade, made to receive the pivot, is so deep that the pivot, in relation to the edges of the branch, is nearly in the middle; yet the width of this branch, opposite to it, is swelled out, so as to give it adequate firmness. The width and the form of the *sides* of the notch are accurately adapted to those of the pivot, and the *bottom* of the notch terminates in an edge, like the knife-edge of a balance, which is intended to rest in, and bear upon, the angle or groove in the pivot. On the under side of the male blade is seen a protuberance, finished so as to present no salient points. It is a shield for the extra length of the screw. When the pivot is screwed entirely down, the branches have no more lateral or rocking motion than those of any other forceps, and, in this condition, they will very generally be used. But by turning the screw, so as to elevate the bearing point, more or less freedom is given to the rocking motion, according to its elevation; and this motion is effectually restricted within any desired limits. When, by means of this free motion, the operator has been enabled to grasp the head, he may sometimes change its position, so that the clams may be then adapted to the head, without the obliquity at first necessarily allowed to them by the elevation of the pivot; and then, if desirable, the pivot may be screwed down, and the blades will become as fixed as those of other forceps."

"It will be seen that the *blades* of those here presented (figs. 106 and 107) resemble nearly those of Dr. Davis. The shanks are considerably longer; the clams are not quite so long; the radius of their pelvic curvature is a little less, especially that of the outer limbs, so that it will be less liable to be obstructed by the promontory of the sacrum, in passing the instrument above the superior strait. The fenestræ are wider in their middle and posterior part than those in most other forceps now in use. When the pivot is elevated, so as to allow the blades their rocking motion, this width becomes especially requisite in order to secure a firm hold on the head, and to avoid the risk of their slipping sideways. The space between the blades is such, that, when applied to the head, the handles shall not be at a distance from each other, awkward and inconvenient to the operator. From the pivot, the upper line of the shank continues forward, without any elevation or depression, to the beginning of the pelvic curvature; and the form and the relation of the shank to the clam are intended to be such as to interfere the least with the perineum.

"While a form has been selected, which, it is believed, will admit of application easy and safe for the mother and child, and grasp the head above the superior strait, it will be seen (fig. 106) that the pivot is in a direct line between the handles and the centre of the fenestræ. This is a *point of importance* in those cases where the rocking motion of the blade may be required, as it will cause each limb of the clams to press with nearly equal force, thus avoiding undue pressure upon any one part of the head, and the liability to slipping or displacement.

"The *handles* are made partly of ebony, and they resemble those of Siebold, although considerably lighter. The precise model, of those represented in the illustration, is not important; for it may be varied to suit the grip or the taste of different operators."

"I am aware that the first impression of some persons, upon looking at the illustrations, will be, that the instrument is too straight, that the pelvic curvature ought to be continued into the shanks. If the whole operation, or the most difficult and important part of it, consisted in passing the blades above the superior strait, narrow blades, with a curve of a wider sweep, like those of Professor Siebold, slipping in probably with rather more facility, would be preferable. But as those here represented can be passed above the superior strait with facility, it seems to me that what I have already said upon the importance, in many cases, of having the pivot in nearly a direct line between the handles and the fenestra, furnishes a valid reason for adopting a model not differing essentially from that here presented.

"Others may object, that unskilful and incautious persons will be tempted to carelessness in applying such a forceps, and to avail themselves of the free motion of its lock unnecessarily. Professors of obstetrics, if they deign to notice it, ought to give

their pupils the proper directions and precautions in the use of this instrument, as they do in that of others. Some persons are, indeed, so unhandy in the use of any instrument or tool, that all the professors in the land cannot give them such tact and dexterity, that they ought to be allowed to approach the puerperal bed. Should this instrument happen to fall into such hands, the danger to either mother or child would probably be much less than from the use of powerful, unaccommodating forceps, misapplied by such hands."

The remarks of Dr. Churchill on the "*period of operating*," are highly judicious, and deserving of the especial attention of the junior practitioner. They are the more satisfactory because they inculcate sounder doctrines, according to our view of the subject, than are to be found in the writings of some of our late as well as older British authors, at least.

Dr. Merriman says, "it is a *rule of practice*, that the forceps shall never be applied, till the *ear* of the child has been within reach of the operator's finger for at *least six hours*."

Dr. Denman pronounced it "improper to attempt to apply the forceps before an ear can be felt."

Dr. Burns says: "In almost every case where the forceps are beneficial, the head has so far entered the pelvis as to have the ear corresponding to the inner surface of the pubes, and *the cranial bones touching* the perineum." Again, "When the finger, without the introduction of the hand into the vagina, can *easily touch the ear*, and when the cranium is in contact with, although not protruding the perineum, the forceps is applicable."

"The delivery of a female with forceps," says Dr. Collins, "when the os uteri is fully dilated, the soft parts relaxed, *the head resting on the perineum, or nearly so*, and the pelvis of sufficient size to permit the attendant *to reach the ear with the finger*, is so simple that any individual, with moderate experience, may readily effect it. I have no hesitation in asserting, that to use it under other circumstances, is not only an abuse of the instrument, but most hazardous to the patient."

If we are never to apply the forceps but when an *ear* can be felt, and "*the head resting on the perineum*," there is indeed little occasion for a long instrument; but what is to become of patients labouring under organic affections of the heart, hemorrhage, convulsions, some tumours of the pelvis, slight contractions of the brim, great debility, aneurism, hernia, arrest of the head from want of proper rotation, &c.? German, French, and American practitioners, will not feel themselves at liberty to stand by in such cases and see their patients sink into the grave without attempting delivery until the *head rests upon the perineum, or an ear can be felt;* nor will they dare to plunge the perforator into the fœtal head, without first endeavouring to save its life by the use of the forceps.

As to the *ear* as a guide, Dr. Rigby is perfectly right in saying that the position of the head should always "be determined by the direction of the fontanelles and sutures, not by feeling for the ear." "The ear can seldom be reached without a good deal of pain, even under the most favourable circumstances."—(Rigby's System of Midwifery.)

The average of the results of British practice, as shown by their statistics, is certainly creditable: this is owing, no doubt, in a great measure, to the prudent avoidance of all unnecessary interference. But in shunning one error, we not unfrequently fall into the opposite extreme; and this would appear to be the case with our brethren of England and Ireland. If we confine our examination to *instrumental cases*, the comparison between them and their neighbours is less flattering to them.

When the difficulty exists "at the brim of the pelvis, it will be better in all cases to apply the forceps in the transverse diameter." If there be want of space, it will be almost always in the antero-posterior diameter, and on that account there will be difficulty in passing the blades of the forceps between the head of the child and the pelvis; not only so, but it is nearly impossible to pass the posterior blade far enough, in consequence of the projection of the sacrum—if the instrument be straight, that is, without the second curve, the extremity will be arrested by the upper portion of the sacrum, or the shank of the blade will press very seriously against the perineum; in fact, it cannot pass thus without pushing this part back with great violence, as any one may see by looking at the vertical view of the pelvis represented in figure 102, page 334.

In attempting to apply the instrument antero-posteriorly, there is always danger of injuring the bladder and rectum, which alone is a sufficient reason for rejecting this mode of operating, if any other will answer.

The only valid reason that can be discovered for applying the forceps antero-posteriorly is, that the pressure made by the instrument in that case is upon the part of the

head corresponding with the least diameter of the brim. But if the blades be made without pretty wide fenestræ, their thickness will be added to that of the head, and will be quite equal to all that will be gained by the compression, if this be confined within the limits prescribed by a regard for the safety of the child; and if the head must be reduced more than this, the perforator should be employed. It must be admitted by all who have had any experience in these matters, that the soft parts of the mother will bear as much compression as the brain of the child: if this be so, where the life of the latter is to be preserved, there is, certainly, no reason why the necessary compression or moulding of its head may not be left to the influence of the resisting parts. When this moulding operation is left to the maternal parts, the compression is made exactly at the points where it is needed, which can hardly be expected from the arbitrary influence of the instrument. Entertaining these views, Dr. Huston has long rejected the forceps as a means of compressing the head, unless when the perforator is required, and employs it only as a lever to alter the position of the head, or as a tractor to aid in its expulsion. That the forceps should never be used as a compressor, but solely as a tractor, is also strongly insisted upon by Professor Meigs. — Editor.

CHAPTER XIII.

OBSTETRIC OPERATIONS. 5. CRANIOTOMY.

546. The next obstetric operation we have to consider, belongs to the second class, that is, where one life is sacrificed to secure the other; the mother's safety being purchased by the destruction of her child, in cases where both would be lost if no interference were attempted.

The instruments (or part of them) employed in this operation, are of great antiquity; and although they were originally proposed for the extraction of dead children only, yet this scruple had not the effect of saving the life of the child, but merely postponed the interference until after its death. This conscientious quibble (refusing to destroy a child, but allowing it to die) was soon detected, and then the hook was used with living children, provided that delivery were otherwise impossible.

The class of cases to which it was applied, doubtless included a vast number which were subsequently relieved by the forceps; but there was still left a great many in which it was indispensable.

Several of the ancients recommend this operation. Hippocrates advises the breaking up of the cranium and extraction by the hook.

Moschion advises embryulcia in those cases where the fœtus cannot be extracted by the hands, and if embryulcia be insufficient, the exsection of the limbs and body of the child.

Albucasis, the Arabian physician, describes instruments for compressing and breaking up the child's head, and others for extracting it.

Of certain cases of difficult labour, when the child is presumed to be dead, Celsus remarks, "Si caput proximum est, demitti debet uncus, qui vel occulo vel auri, vel ori interdum etiam fronti rectè injicitur."

In the 'Birth of Mankinde,' written by Eucharius Röslin, translated into Latin about the year 1535, and into English by Thomas Raynalde, in 1634, I find the hook recommended to bring away dead children. "If so be," he says, "that it lie the head forward, then fasten a hook either upon one of the eyes of it, or the roof of the mouth, or under the

chin, or on one of the shoulders — which of those parts shall seem most commodious and handsome to take it out by, and the hook fastened to draw it out very tenderly, for hurting of the woman." If the head be too large, it is to be opened with a sharp penknife, or broken in pieces.

He also recommends excision of the extremities, if they present, (the child being dead,) or evisceration, to facilitate the delivery.

Ambrose Parè's work is dated 1579, and it was translated into English in 1634. In it are given plates of different hooks for drawing out the child, and a knife for the excision of the limbs.

From this time we find the operation recommended by every author, but the instruments underwent considerable modification, and the class of cases in which they were used considerably decreased. Of course this latter change was one of the consequences of the invention of the vectis and forceps.

547. The following are the principal modifications of the instruments for craniotomy:

1. Albucasis describes a species of forceps with teeth, which he terms a "misdach, or almisdach," for the purpose of crushing the head, and enabling it to pass.

2. He also gives a plate of a single and double hook, for extracting the child, and of a knife for cutting off the head.

3. Ambrose Parè contrived two kinds of blunt hooks, and a double one with sharp points, for the extraction of the fœtus, and a knife for excision.

4. Mauriceau invented an instrument which he called a "tire tête," consisting of a circular plate of steel, fixed upon a rod. The circular plate was to be introduced into the head, (previously opened by a scalpel,) and being placed across the opening, traction was to be made. This instrument was never much used, owing to the difficulty of introduction, and its feeble power when introduced.

5. Sir F. Ould's "terebra occulta" consisted of a sharp-pointed rod inclosed in a canula or sheath, and retained by a spiral spring at the lower end. When the handle was pressed upwards, and the resistance of the spring overcome, the point of the instrument protruded a certain distance, but was retracted when the pressure upon the handle was removed. Its application to the head was easy and safe; but it must have been nearly useless, from the small opening it made.

6. Dr. Simpson, of St. Andrews, invented an instrument which he called a "ring scalpel," for opening the skull. It consists of a loop of steel, through which the finger is to be passed, and from which protrudes a sharp-pointed blade about an inch long, by which the cranium was pierced.

7. M. Mesnard described a crotchet which could be used either double or single, and which was the original of the one in present use. He also gives a plate of a "perce-crane," and a pair of "tenettes à conducteur," that is, craniotomy forceps.

8. Dr. Burton copied Mesnard's double crotchet and "perce-crane" with some slight modification.

9. M. Levret gives a plate of a single crotchet which was arranged to fit into a socket on the top of another blade for the purpose of protecting the mother, and rendering the purchase more secure.

10. Dr. Smellie recommended Mesnard's crotchet (single or double); but instead of the "perce-crane," he used a pair of strong scissors, with stops at the shoulders to prevent the blades entering too far. Denman abolished the cutting edge altogether, and added strength to the blades. A spoon was also used to evacuate the brain, but it is now very properly discarded.

11. Dr. Wallace Johnson published an account of his instruments for opening the head and extracting the child. I do not know that they have ever been used by any other person.

12. Dr. Aitken proposed a flexible or living crotchet, which could be adapted to the convexity of the child's head.

13. M. Baudelocque recommended a very simple extractor, consisting of a small piece of wood, to the centre of which a ribbon was attached. An incision having been made with a bistoury or "perce-crane," the bar of wood was to be introduced and placed crosswise, and then extraction made by the ribbon.

14. M. Osiander has given a plate of an instrument for piercing the skull, and another for extracting. The latter is the same as Smellie's double crotchet.

15. M. Joerg advises an instrument like a trephine for opening the head, and a simple hooked rod for extraction.

16. Dr. Davis has invented several species of crotchet, both single and

Fig. 108.

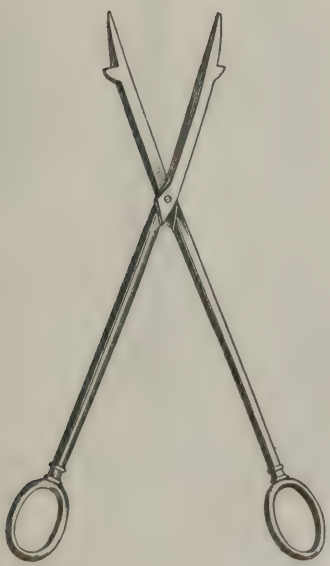
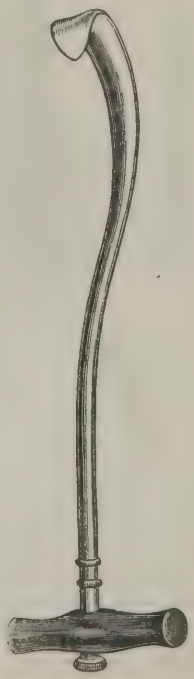


Fig. 109.

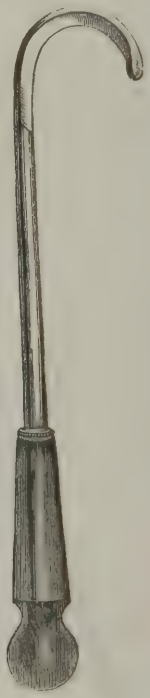


double, as well as a pair of forceps for breaking up the skull. These are well exhibited in the fourth edition of his work.

These are a few of the principal instruments which have been employed in the operation of craniotomy. I have not given a detailed description, because most of them are discarded; the instruments in general use being a pair of scissors with shoulder-stops, as recommended by Smellie, but having a sharp edge on the outside (fig. 108), and a modification of Mesnard's simple crotchet (fig. 109). I have found it an advantage to shorten the points of the scissors above the stops, and also the hook of the crotchet; the latter of which should be slightly cleft. Mr. Holmes has modified the latter, so that by closing the handles we open the blades (fig. 110). Further, I have added plates of a knife for cutting off the head or limbs if necessary (fig. 111), a blunt hook (fig. 112), and Dr. Davis's bone forceps for breaking up the skull (fig. 113).

Fig. 110.

Fig. 111.



From tne inconveniences sometimes experienced with the crotchet, and to avoid the risk of injuring the mother, craniotomy forceps have been employed by different individuals.

Among the moderns, M. Mesnard has the credit of first inventing and using this instrument, and since his time it has undergone various modifications.

Dr. Haighton used a pair resembling the lithotomy forceps; and since his time Drs. Conquest and Davis, Mr. Holmes, and others, have invented and described varieties of the instrument (fig. 114). The object of each is the same, viz. to avoid the risk of tearing the soft parts of the mother; and the principle of seizing the skull between two blades, furnished with teeth, is also alike.

Fig. 112. Fig. 113. Fig. 114.

I am free to confess that I do not like the craniotomy forceps, although I have tried them repeatedly. They are by no means so manageable as the crotchet; and the interposition of the hand of the operator will always protect the mother from injury by the latter.

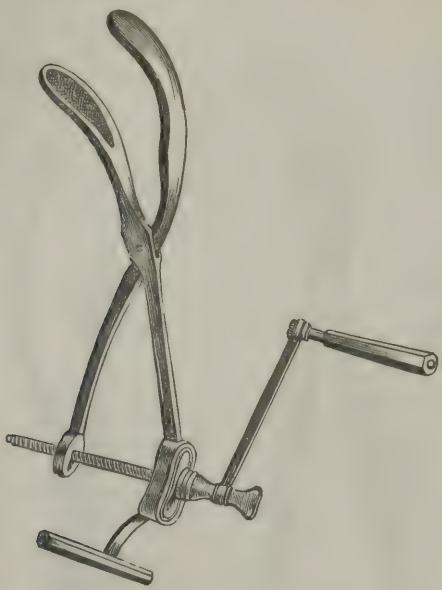
There is one case, however, in which the forceps may be more useful, and that is, when the bones of the head are extremely hard, so that it is almost impossible to fix the point of the crotchet.*

17. M. Baudelocque, jr. has invented an instrument, which he calls a "cephalotribe," for the purpose of crushing the head (fig. 115.) It consists of a very strong pair of forceps, about two feet in length, the handles

* Professor Meigs uses the forceps and perforator represented in figures 116 and 117. These forceps possess advantages over the ordinary instruments for extraction after

of which are connected by a screw which pierces them, and which is turned by a handle until the blades are so closed as to effect their object.

Fig. 115.



Velpeau states that instruments somewhat similar have been formerly used by Assalina, Osiander, Delpech, Colombe, &c. M. Baudelocque is said to have used it three times successfully (and safely as regards the mother) in the year 1832, and once again in 1834. It is also said that M. Champion has tried it with success.

Its appearance is so formidable, that I doubt if it could be used in this country. I am not aware that the attempt has been made.

548. *The object of the operation* of craniotomy is to terminate the labour with safety to the mother, in cases where from the disproportion between the size of the fœtal head and the pelvis, a living child can neither be expelled by the natural powers, nor extracted by the forceps. Such a case, if left to nature (as it is called) will terminate fatally for both mother and child; consequently, although the child is destroyed to facilitate the delivery, and to save the mother, it can hardly be said to be sacrificed, inasmuch as no efforts of ours could have ensured its safety.

The case presupposes on the one hand, *actual disproportion, sufficient to prohibit the passage of the fœtal head, even when compressed;* and on the other, *that the distortion is not so great as to prevent the extraction of the child when mutilated.*

perforation of the head, and are certainly safer in unpractised hands than the crotchet.

They are eleven inches in length; the gripe is serrated and the sides of the man

Dr. Osborn states that when "the bones approach much nearer to each other than three inches, it is utterly impossible for a living child at full maturity by any means to pass."* He fixes upon $2\frac{3}{4}$ inches as the diameter rendering craniotomy necessary. M. Alphonse Le Roi says that $3\frac{1}{4}$, Dr. Atkin 3, Dr. Jos. Clarke $3\frac{1}{2}$, Dr. Burns $3\frac{1}{4}$, Dr. Ritgen 2, and Dr. Busch $2\frac{1}{2}$ to 3 inches, is the smallest antero-posterior diameter through which a living child can pass.

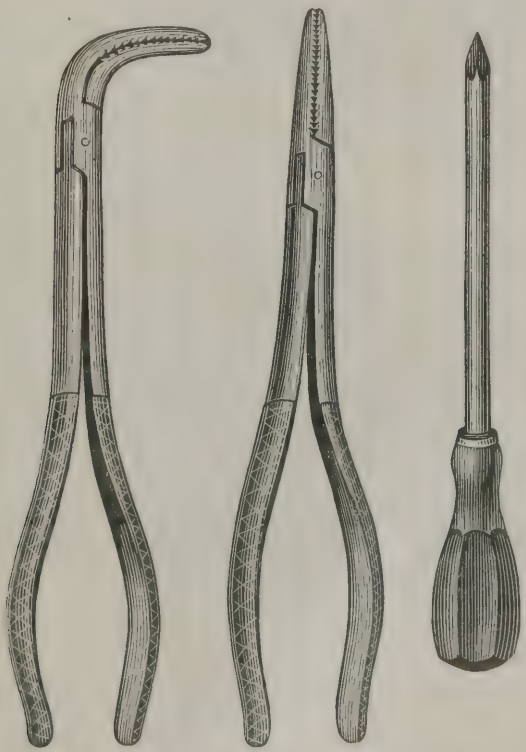
As to the other limit of the operation, that is, the smallest diameter through which a child can be extracted after craniotomy, Dr. Osborn† remarks:

"Whenever there is a space from pubis to sacrum, or from the fore to the hind part of the upper aperture of the pelvis, equal to an inch and a half, I am convinced it will be always practicable to extract a child by the crotchet, after the head has been some time opened, and the texture

dibles are rounded, in order that they may not pinch any tissues except those intended to be included in the bite, which, on account of the serræ, is very sure and strong.—(See *Obstetrics — The Science and the Art*, 2d edition.)

DR. MEIGS'S EMBRYULCIA INSTRUMENTS OR PLIERS.

Fig. 116. Fig. 117.



* Essays on Midwifery, p. 194. † Ibid, p. 200.

of the child's body is softened by putrefaction (as recommended above) and the whole of the parietal and frontal bones are picked away."

Baudelocque says that the crotchet is inadmissible when the diameter is only $1\frac{2}{3}$ of an inch; Dr. Dewees, when it is less than 2; Dr. Hull and Dr. Burns believe that it may succeed when the diameter is $1\frac{3}{4}$; MM. Gardien and Hamilton when it is $1\frac{1}{2}$; and Dr. Davis when it is 1 inch.

549. The *nature of the operation* is simple, but the aid afforded may vary in degree.

1. In the case of dead children, the older practitioners used the crotchet alone as an extracting force, without opening the head.

2. In some cases where the sutures are very loose, the evacuation of the brain will be sufficient, as the bones of the cranium collapse so much under the influence of the pressure downwards, that the child may be expelled by the natural powers. But in this case, it is assumed that the pains are sufficiently strong and frequent.

3. When (as is frequently the case) the pains are inefficient, or when the state of the patient demands prompt relief, then we must not only evacuate the brain, but add extracting force by means of the crotchet or craniotomy forceps.

4. In some cases, the distortion of the pelvis is too considerable to admit the passage of the head, even when emptied of its contents; or the obstruction may result from the ossification of the bones of the skull; in either case, an extension of the operation is necessary to complete the delivery. This may be effected by breaking up the cranium with a small pair of forceps, resembling Dr. Davis's; or, according to M. Baudelocque, jun., by the use of the cephalotribe. It would require unusual hardihood to venture upon the latter instrument in private practice in this country.

5. In these cases of distortion, after the head has been extracted piecemeal, we may find it impossible to bring away the body of the infant. We must then use the perforator, for the purpose of evacuating the contents of the chest and abdomen, and afterwards apply the crotchet to extract the child.

One or more of these modifications of the operation will be successful in all cases which come within the limits already described.

550. Statistics.—The positive *advantage* we obtain from embryotomy is the safety of a large proportion of the mothers, who, in addition to the children, must have perished had no aid been afforded. The children of course are all lost.

What the proportion of success is, I shall now endeavour to show; but previous to this I shall adduce whatever evidence we possess to ascertain the comparative frequency of the operation.

FREQUENCY OF THE OPERATION.

a. *Among British Practitioners.*

Date.	Authors.	Total No. of Cases.	No. of Crotchet Cases.	References.
1781	Dr. Bland	1,897	8	Merriman's Synop. p. 333.
1787 to 1793	Dr. Jos. Clarke . . .	10,387	49	Trans. of Assoc. vol. 1.
	Dr. Merriman. . . .	2,946	9	Synopsis.
1818	Dr. Granville	640	3	Report, p. 25.
1828, 1829	Dr. S. Cusack. . . .	701	5	Dublin Hosp. Reports.
1832, 1833	Dr. Maunsell	839	5	Ed. and Dub. Jour.
1829	Mr. Gregory	691	2	Dub. Hosp. Rep. vol. 5.
1826 to 1833	Dr. Collins.	16,414	79	Practical Treatise.
1834	Dr. Thos. Beatty . .	1,182	3	Dub. Jour. vols. 8, 12.
	Mr. Lever	4,666	25	Guy's Hosp. Reports.
	Dr. Read	3,250	15	
1836, 37, 38, 39	Dr. Churchill	1,640	11	Reports to June, 1840.
1838	Mr. Warrington . . .	88	1	American Journal.
1829	Mr. Mantell	2,510	3	Do.
1848	Drs. M'Clintock and Hardy . . .	6,634	52	Pract. Obs. p. 95.

b. *Among French Practitioners.*

Date.	Authors.	Total No. of Cases.	No. of Crotchet Cases.	References.
1797 to 1809	Madame Boivin . . .	20,517	16	Mémorial, p. 337.
1803 to 1811	Madame Lachapelle. .	15,652	14	Prat. d'Accouch. p. 500.

c. *Among German Practitioners.*

Date.	Authors.	Total No. of Cases.	No. of Crotchet Cases.	References.
1801 to 1807	M. Richter, Moscow .	2,571	3	Velpeau.
1811 to 1827	Moschner and Kursak, Prague	12,329	4	Siebold's Jour. vol. 9.
1812	Dr. Siebold, Wurtzburg.	170	1	Do. vol. 1.
1818 to 1829	Do. Berlin . .	97	1	Do. vol. 10.
1832	Do. Marburg .	155	1	Do. vol. 13.
1814 to 1827	Dr. Carus, Dresden. .	2,908	9	Do. vol. 9.
1819	Dr. Ritgen, Giessen .	103	1	Do. vol. 6.
1825 to 1827	Dr. Kilian, Copenhagen	2,350	4	Velpeau.
1794 to 1804	Dr. Henne, Prague . .	500	1	Siebold's Jour. vol. 2
	Dr. Naegelè, Heidelberg	1,411	5	Velpeau.
1821 to 1825	Dr. Riecke	219,303	84	Do.
1825, 26, 27	Dr. Klugè, Berlin . .	809	8	Siebold's Jl. vols. 7, 9.
1825	Prof. Andrée, Breslau .	351	2	Do. vols. 7, 8.
1827	Dr. Küstner, Breslau .	176	2	Do. vol. 9.
1829	Dr. Adelmann, Fulda .	57	1	Do. vol. 11.
1797 to 1837	Dr. Jansen, Ghent . .	13,365	5	Med. Gaz., March 6, 1840.

Thus, among British practitioners, we have 270 crotchet cases in 54,485 cases of labour — or about 1 in 201¾.

Among the French, 30 crotchet cases in 36,169 — or 1 in 1205⅔.

And among the Germans, 132 crotchet cases in 256,655 labours — or 1 in 1944⅓.

Added together, we have 347,309 cases, and 432 in which the crotchet was used — or 1 in 803¾.

RESULTS OF THE OPERATION TO THE MOTHERS.

Authors.	No. of Crotchet Cases.	Mothers died.	Authors.	No. of Crotchet Cases.	Mothers died.
Dr. Smellie	44	4	Dr. Beatty	3	0
Mr. Perfect	3	0	Dr. Churchill . . .	11	1
Dr. Jos. Clarke . . .	49	16	Mr. Warrington . .	1	0
Dr. Granville. . . .	3	3	Dr. Siebold	3	1
Dr. Ramsbotham . .	34	5	Dr. Ritgen	1	0
Dr. Maunsell . . .	5	2	Dr. Klugè	8	3
Mr. Gregory. . . .	2	1	Dr. Andrée	2	1
Dr. Collins	79	15	Dr. Küstner. . . .	2	0
Drs. M'Clintock and Hardy	52	8	Dr. Adelmann . . .	1	0

This table gives a mortality of 60 in 303 — or about 1 in 5.

At first sight one would expect the mortality among the mothers to be less, after the use of the crotchet than the forceps; but the result of these investigations shows the reverse to be the case. The only explanation I can give, is founded upon the natural unwillingness of every humane practitioner to destroy life — the consequence of which feeling is, the delay of the operation so long as there is a hope of evading it. This delay, however, is unfavourable to the mother, and when at length the operation is performed, although it may have been less severe than delivery by the forceps, yet her condition rendered her much more susceptible of injury from it.

551. The *comparative* advantages of the operation are very decided. In the cases we have supposed, the forceps is useless, and the natural powers inefficient; if, therefore, embryotomy were rejected as inadequate, the only *alternative* would be the Cæsarean section, the mortality of which is much greater, for 1 in 2⅓ of the mothers are lost; and 1 in 3½ of the children.

It would, however, be a serious omission if I did not notice another *alternative* operation, which, although not available after labour has commenced, may supersede the necessity for embryotomy in subsequent pregnancies. I allude to the induction of premature labour. In all cases where pelvic distortion renders craniotomy necessary at the full time, it becomes our duty to recommend the induction of premature labour in subsequent pregnancies, at such a period as shall, if possible, afford a chance of life to the child, or at least save the mother from a severer operation. The mortality among the mothers is about 1 in 50, and more than half the children are saved.

552. So much for the positive and comparative advantages of the operation. I am not aware that there can be any just *objections* against it, in suitable cases: but undoubtedly there are most weighty objections against employing it, without careful consideration and consultation. In fact, it ought to be deeply impressed upon every practitioner, that he who destroys the child, without due evidence that this is his only resource for saving the mother, is guilty of murder.

But it may be asked, when the responsibility is so serious, what evidence

will be sufficient to satisfy a conscientious practitioner that he may not be committing a crime in his anxious endeavour to afford relief? To this it may be answered:

1. That the continuance of strong labour pains for a certain time, without any advance of the head of the child, is so far evidence of a fixed obstacle to the passage of the child.

2. The failure of a cautious attempt to introduce the forceps, will, to a certain extent, demonstrate the amount of the disproportion between the head and the pelvis; and the failure of a careful yet firm attempt at extraction by the forceps (when the application has been effected), will prove that the disproportion cannot be remedied by compression.

3. A well-educated finger will enable us in most cases to ascertain whether the diameters of the pelvis are such as will allow of the passage of a living child. And even though this mode be uncertain, we have a means of correcting our estimate, by comparison with the child's head, in apposition with the pelvis. If the natural efforts after several hours, or the forceps with a proper and safe amount of compression and force, cannot bring the widest part of the head of the child through the narrow part of the pelvis, we may fairly conclude that the only resource is craniotomy.

4. The general condition of the mother will also aid our decision. If she be much exhausted, if fever be present, the uterus powerless, the life of the child doubtful, and the success of the forceps dubious, we may shrink from inflicting the double shock of an unsuccessful application of the forceps, and subsequent delivery by the crotchet. But these cases are very rare; they only happen when the patient has been mismanaged, and it requires experience and judgment to decide upon the propriety of terminating them by embryotomy.

A careful consideration of these circumstances will, I think, enable us to arrive at a correct conclusion in an individual case; and as the responsibility incurred in the destruction of the infant may lead to timidity, it should also be remembered, that hesitation to act when the case is clear, involves a more fearful responsibility, by compromising the life of the mother.

553. The *cases* in which the operation is demanded are:

1. When the child is dead and the labour tedious. But we must be quite sure that the child *be* dead, before this is made the ground of interference. If the head be putrid, and there is space in the pelvis, it is much better to use the forceps, as the bones and integuments of the skull give way so easily under the crotchet, that it is sometimes very difficult to extract the child. I have seen the operation prolonged two hours from this cause alone.

2. In distortion of the pelvis, when the antero-posterior diameter of the brim is less than three inches, we have no chance of delivery by the natural efforts or by the forceps; so that to save the mother, we must destroy the child.

3. When the transverse diameter of the lower outlet is diminished to the same extent by the approximation of the tubera ischii, if the forceps applied antero-posteriorly are insufficient to move the head, we must have recourse to craniotomy.

4. When the calibre of the pelvis is diminished to a certain degree by a fixed obstacle — as, for example, a fibrous tumour, or an exostosis growing from the bone or periosteum, it may not be possible for the natural efforts alone, or aided by the forceps, to expel the child. In such cases it will be necessary to lessen the head and apply the crotchet.

In these three latter classes of cases, the passage through the pelvis may be so much diminished as to render it necessary to break up the skull, or to eviscerate the child.

5. In some cases of ovarian disease, where the tumour has formed adhesions within the pelvis, so as to prevent its being pushed above the brim, it has been found necessary to lessen the head, before the child could be extracted. We are not, however, to decide upon this measure until the natural powers have had a fair trial, as it sometimes happens, that in the progress of labour the tumour is so much displaced as to allow of the passage of the child (§ 437). Further, it will be worth while, before sacrificing the infant, to ascertain whether the contents of the tumour may not be drawn off, by passing a long trocar into it. If a small quantity of fluid escape, it may allow of the application of the forceps, and so enable us to save the child. If, however, the tumour prove to be solid and immoveable, we must, as a "*dernier ressort*," have recourse to the perforator and crotchet.

6. When the child is hydrocephalic to such an extent as to prevent its entering or passing through the pelvis, whether distorted or of the natural size, there can be no question of the propriety of opening the head.

7. In some cases of convulsions, rupture of the uterus, &c., where immediate delivery is necessary, *and where the forceps cannot be applied*, craniotomy must be performed.

8. In flooding cases, before the head has passed through the os uteri, if the cervix be dilatable the child may be thus delivered; and this is peculiarly desirable when the flooding is large and the child premature. Of course it cannot be attempted when the placenta covers the os uteri, nor need we have recourse to it unless the woman is endangered by the hemorrhage.

9. If an arm descend along with the head, the diameters of which correspond closely to those of the pelvis (whether the latter be of the usual size or not), it may be necessary to terminate the labour by opening the head.

10. I have already alluded to a class of cases, where, from mismanagement, the patient has been allowed to continue too long without help, and in consequence is greatly exhausted, with fever, quick pulse, delirium, &c. In such cases the patient will die if she be not assisted; and from the unfavourable state in which she is, she cannot bear a prolonged or very painful operation. Now if there be sufficient space for the forceps, they ought to be preferred, and it would be very wrong to use the perforator; but if this be doubtful, and the probabilities against our succeeding with that instrument, then the consideration of the patient's inability to bear a severe operation may in some cases decide us in favour of embryotomy. These cases, however, are but few, and they must be well marked, to justify our adopting at once such extreme measures.

11. In footling or breech cases, when the head (separated or not from the body) cannot be extracted, we must evacuate its contents.

554. The next question to be decided is the *period of labour* at which the operation should be performed.

1. In all cases where the diminution of the pelvic diameters is so great as to render it impossible that a living child can be born naturally or extracted, there can be no hesitation in recommending that the head should be opened at an early period of the labour, say as soon as the os uteri is dilated or fully dilatable. By this means we shall afford a chance of the completion of the labour by the natural powers, as there can be no objection to waiting a few hours before extracting the child.

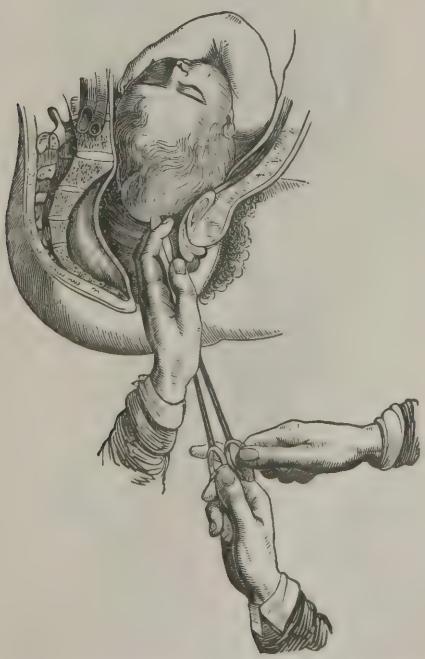
2. When the distortion is less, we cannot be sure as to the result of the natural efforts, and we must wait until it is evident that they are inadequate; then an endeavour should be made to use the forceps, and if this fail, there should be no delay in the performance of embryotomy.

3. These observations will apply equally to the case of morbid growths, ovarian disease, &c., obstructing the passages.

4. In cases of convulsions, ruptured uterus, &c., the time for the operation is determined by circumstances connected with those accidents, and which will be found laid down in the chapters on the subject.

5. In the mismanaged cases to which I have alluded, the condition of the woman, which determines the necessity for the operation, will also point out the importance of promptitude. If the case be so bad that we dare not risk a failure with the forceps, it is clear that we cannot afford to delay embryotomy.

Fig. 118.



555. Mode of operating. — It is not absolutely necessary for the operation that the os uteri should be fully dilated, though it is a great advantage, and greater care will be required when this dilatation has not taken place.

The rectum and bladder are first to be evacuated; the patient is then to be placed on her left side, with the hips over the edge of the bed, and an assistant beside her, to fix and steady the abdomen.

One or two fingers of the left hand are then to be introduced into the vagina, and their extremities fixed upon that part of the head of the child which is to be perforated. Contrary to ancient practice, this should never be the sutures, because after the incision is made in that situation, the bones collapse and close it. Having determined upon the situation, the perforator is to be passed along close to the palm of the hand and the inside of the fingers, so as to avoid injury to the soft parts of the mother.

Having arrived at the point of insertion into the skull, guided and guarded by the fingers of the operator, it is to be pressed firmly forwards with a semi-rotatory motion, until it pierce the bone (fig. 118); it is then

Fig. 119.

to be passed in up to the shoulders, and the handles are to be separated by an assistant as widely as possible (fig. 119). The cutting edges of

the scissors are then to be placed at right angles with the first incision, and again separated, so as to make a crucial incision.

This being effected, the perforator is to be passed into the skull, the brain thoroughly broken up, and the medulla oblongata cut across. The scissors are then to be withdrawn, and the first part of the operation is completed.

The left hand is again to be introduced, as a guide and guard to the crotchet, which should be passed into the cranium for the purpose of completely breaking up the brain. I dwell upon this point, because instances are on record of the child being born alive after the operation of craniotomy, to the disgrace of the operator, and the distress of the patient and her friends. When this object is attained, if we wish to terminate the operation at once, the crotchet may be fixed on the outside or inside of the head; the former was adopted by the older practitioners, but the latter is recommended generally at present (fig. 120). In some cases it is useful to employ two crotchets—one internally and the other externally.

Fig. 120.

The scalp should be carefully folded over the edges of the bones, in order to prevent injury to the passages, and then extracting force must be gradually and steadily applied during the pains, or at intervals, in imitation of them.

The left hand should be passed into the vagina, and placed on the head, opposite to the insertion of the crotchet, both for the purpose of steadying it and of preventing mischief if the instrument should slip. If the part of the skull in which the crotchet is fixed give way, we must obtain another purchase.

The amount of force, and its continuance, will depend of course upon the resistance to the passage of the child; but if after a certain time no progress be made, in order to avoid contusion of the soft parts of the mother, it will be well to break up the skull with the forceps adapted for that purpose (fig. 113).

The perineum must be carefully guarded, and care must be taken that no injury be inflicted by the speculæ of bone.

After the head is extracted, the body generally follows without much difficulty; but should this not be the case, we must have recourse to evisceration. The scissors must be plunged into the chest, and the contents broken up: the crotchet hooked upon the ribs, and traction exerted. The contents of the abdominal cavity may be evacuated in a similar way, and after this we shall generally be able to extricate the child.

Fig. 121.

If the craniotomy forceps be used, one blade must be passed into the skull, and the other on the outside, and sufficiently far to secure a firm hold (fig. 121); the blades then being closed, the operator must draw down firmly, yet gently, and at intervals.

556. The principal *difficulties* of the operation are as follows:

1. If the bones of the skull be very firm, it is not easy to perforate, and the point of the scissors is very apt to slip. This can only be avoided by great care and steadiness.

2. A similar state of the bones will offer a serious obstacle to the insertion of the point of the crotchet; but a little perseverance will in most cases overcome it. The fingers of the left hand placed on the outside of the skull, will render it still more easy.

3. The extraction may be difficult. If the narrowing be not too great,

the difficulty may be overcome by steady force; but if such a degree as may be exerted with impunity do not move the head, we must then break up the skull, as already stated.

557. The *dangers* to which the patient may be exposed in this operation, are more serious than when the forceps is used.

1. The perforator may slip, and the vagina or uterus be wounded.
2. The hook may slip, or the bone in which it is fixed may suddenly give way; and if the hand of the operator be not interposed, a severe or even fatal rent may be inflicted.
3. The perineum may be lacerated by the injudicious exertion of extracting force.
4. From the condition of the patient, she generally suffers more from the shock to the nervous system, than in the operations previously described.
5. There is also greater danger of subsequent inflammation of the womb or vagina, with perforation of the bladder, especially if much force have been necessary.

558. *After-treatment.* — The nervous shock will be best remedied by quiet, small doses of opium, and moderate stimulation.

The state of the vagina and uterus should be carefully watched, and vaginal injections of warm water used occasionally.

If any symptoms of inflammation arise, they must be met promptly by the appropriate remedies, — venæsection, leeching, calomel, and opium, &c.

In other respects, if the patient go on well, she must be treated as after natural labour.

CHAPTER XIV.

OBSTETRIC OPERATIONS. 6. THE CÆSAREAN SECTION, OR HYSTEROTOMY.

559. So far, I think, our investigations have fully borne out an observation made in a former chapter (§ 473), viz.: that obstetric operations formed an ascending series—each one exceeding the other in importance and danger; and that whilst no two could be compared in terms of equality, the value of each was shown by its alternative, which is always one of greater danger. Thus the mortality of premature labour is less than its alternative, the crotchet; that of the forceps less than the crotchet; and we shall now see that inasmuch as when it is employed early, the safety of the mother is nearly secured, the danger of embryotomy is far less than that of the Cæsarean section. This operation is indeed the "*dernier ressort*" of midwifery. Preferable as it is to the certain death of both parties, it is far more serious in its consequences than any other operation. It comes under the class of operations already noticed, in which the life of mother and child are necessarily more or less compromised.

It is of very ancient date, being known to the Greeks, and called ὑστεροτομοτοκια, or εμβριοελκη; but I believe by them only employed after the death of the mother.

From the circumstances of several remarkable personages having entered the world in this way, it was deemed fortunate to be so born—a royal road, in short, to distinction.

Pliny has recorded that Scipio Africanus was thus extracted. He says, "Auspicatius enecta matre nascuntur, sicut Scipio Africanus prior natus." He is not correct, however, in stating that Scipio was the first thus brought into the world; Claudius Cæsar, who distinguished himself in the war with the Samnites, having preceded him.

From being thus "cut out" of their mother's womb, these individuals were first termed "Cæsones," afterwards "Cæsares," on the authority of Pliny, Festus, Pompeius, Solinus, &c. "Quia cæso matris utero in lucem prodiscunt."

Cæso Fabius, who was three times consul, was thus extracted.

Julius Cæsar is also stated to have been brought into the world by means of this operation, although it is an error to state that the name Cæsar was given to him on this account, inasmuch as he inherited it from his father.

Among the ancients, persons thus born were considered sacred to Apollo, to which Virgil alludes in the lines—

> "Unde Lycham ferit exsectum jam matre peremtâ
> Et tibi, Phœbe, sacrum." — ÆNEID, x. 315.

Thus Æsculapius was called the son of Apollo, because (it is said) he was brought into the world by hysterotomy.

For this reason also, those things in Rome which were sacred to Apollo, were preserved by the family of the Cæsars.

Some modern historians have included Edward VI. King of England, among those who benefited by this operation, and this statement is repeated in some works on midwifery. I have taken some trouble in tracing this story, and I find no reason to believe it to be true. Sir John Hayward, in his "Life and Reign of Edward VI.," was the first to put it upon record. He says, "All reports do constantly run that he was not by natural passage delivered into the world, but that his mother's body was opened for his birth, and that she died of the incision the fourth day following."

That the latter statement is inaccurate, is proved by an examination of a MS. of the ceremonies of her funeral. Queen Jane Seymour died Oct. 24, 1537, twelve days after King Edward's birth. With regard to the mode of the king's entrance into life, I shall quote the words of the compiler of these memoirs. In the notes he observes, that Sir John Hayward was the first to record the fact, "for none of our historians that wrote before Hayward, give any countenance to this, but only mention her departure soon after, except it be Sanders, (whose pen was not directed so much by truth as malice,) who frames a story, that when the Queen was in extreme labour, they asked the King whom he would have spared—the Queen or his son? He answered his son, because he could easily find out other wives. But yet even he has not a word of cutting the young infant out of his mother's belly." This story is manifestly fabulous, inasmuch as the fact of the infant being a son could not be known before its birth, and otherwise the point intended by it would be without force, because he had already a daughter. The commentator adds, "that Dr. Burnet (now bishop of Salisbury) mentions original letters in the Cotton Library, that show how the Queen was well delivered. These letters are exemplified in Fuller's Church History, the one from the Queen herself and the other from her physicians, both written to the Privy Council."

This evidence, I conclude, sets the question at rest, and I ought perhaps to apologise to my readers for occupying so much time with it; but it appeared to me to be as well to ascertain the truth about it.

There is also a tradition that Robert II. King of Scotland, was born by the Cæsarean section, an accident having happened to his mother.

To return to the regular history of the operation.

Rousset, about 1581, published a treatise on the Cæsarean section, in which he quotes ten successful cases. On one of the patients the operation was performed six times; she became pregnant a seventh time, and no one being willing to operate, she died undelivered. His essay was translated into Latin by Bauhin, 1661, and may be found in Stach's Collection.

To this work of Rousset's, Bauhin added an appendix of cases; he states that he saw the operation performed seven times.

There is no doubt that in many of these cases the operation was unnecessary; but I do not see ground for Mauriceau's assertion that "that which Rousset reports of the Cæsarean section, is nothing but the ravings, capriciousness, and imposture of their authors."

There is no mention of the operation in Raynalde's work on the "Byrth of Mankynde" (1634), nor in the "Childbearer's Cabinet," so that

we are indebted to the French and Germans for our earliest information on the subject.

Ambrose Parè, whose work was translated in 1634, (having been written in 1570,) was opposed to the performance of the operation on the living woman, on account of the danger of hemorrhage, but recommends it for the purpose of saving the child when the mother has died suddenly.

In the translation of Guillemeau's work, 1635, there is a chapter on the Cæsarean section, which is recommended immediately after the death of the woman, "that thereby the child may be saved, and receive baptism." "In some women," the author observes, "I have made this practice very fortunately, and among the rest, in Mad. le Mabre, M. Phillippes my uncle being joined with me; and likewise in Mad. Pasquier, presently after she was dead, Mons. Paræus and the Curate of St. Andrew being present." As to performing it on living women in difficult labours, he says, "Which for my owne part I will not counsell any one to do, having twice made tryall of it myselfe, in the presence of Mons. Paræus, and likewise seene it done by MM. Viart, Brunett, and Charbonnet, all excellent chirurgions, and men of great experience and practice, who omitted nothing, to do it artificially and methodically. Nevertheless, of five women in whom this hath been practised, not one hath escaped. I know that it may be alledged that there be some that have been saved thereby; but though it should happen so, yet ought we rather to admire it, than either practice or imitate it." . . . . . "After Mons. Paræus had caused us to make trial of it, and seene that the success was very lamentable and unfortunate, he left and disallowed this kind of practice, together with the whole college of chirurgions of Paris."

In Chamberlen's translation of Mauriceau (1672), we find a strong protest against performing the operation on living women, and great doubts expressed as to its having ever been successful. He admits its utility when the mother is dead.

Dionis, whose work was translated in 1719, has a chapter on the Cæsarean section which he recommends when the woman is dead, but deprecates it during her life. He describes the operation minutely.

Sir F. Ould, 1742, is the first British author I possess who notices the operation, which he says may be performed "either while the mother is living, or after her death, according to the nature of the circumstances." Nevertheless, he observes that the "Cæsarean operation is most certainly mortal, as we shall endeavour to prove presently from reason and the nature of the thing; and I hope it will never be in the power of any one to prove it by experience."

La Motte's work was translated in 1746. He neither discredits the cases related by previous authors, nor doubts the possibility of success; but he observes, "the os sacrum, ischium, and pubis, being from their first conformation so close to one another, that the surgeon can hardly introduce a few fingers between them, it being consequently impossible for the child to come through, is the only case where this operation is to be put in practice."

Burton, in 1751, entered into a more minute detail than any of his predecessors, and gives references to cases. He concludes that "seeing, therefore, both reason and repeated experience confirm the possibility of

success in this operation, nothing should deter a skilful operator from performing it when it is absolutely necessary."*

Smellie, 1751, takes, as usual, a sound common sense view of this matter: "When a woman," he observes, "cannot be delivered by any of the methods hitherto prescribed and recommended in laborious and preternatural labours, on account of the narrowness or distortion of the pelvis, into which it is sometimes impossible to introduce the hand; or from large excrescences and glandular swellings, that fill up the vagina and cannot be removed; or from large cicatrices in that part and at the os uteri, which cannot be separated; in such emergencies, if the woman is strong and of a good habit of body, the Cæsarean operation is certainly advisable, and ought to be performed; because the mother and child have no other chance to be saved, and it is better to have recourse to an operation which hath sometimes succeeded, than leave them both to inevitable death."†

The operation is described by almost all authors, both English and Continental, but with considerable difference of opinion both as to its usefulness, and the cases to which it is applicable. I shall not, however, occupy the reader with further detail, but again refer him to my Researches on Operative Midwifery for those minute particulars which would be misplaced here.

560. After this short sketch, we may proceed to consider the operation itself, its object, and the means for attaining it.

The *objects* of this very formidable operation are of extreme importance.

1. To afford a chance of escape to the mother, and of life to her offspring, in cases where the child cannot be extracted through the natural passages by any means at our command.

2. To extract the child so promptly, as to afford it a chance of life, when the death of the mother has taken place suddenly.

3. To relieve the mother from the risk of fatal inflammation, owing to the presence of the fœtus in the abdominal cavity, acting as a foreign body.

561. The *nature* of the operation by which these objects are to be effected, is simple, viz., that of cutting through the abdominal and uterine parietes, so as to come at the child, and then removing the entire contents of the uterus, and closing the external incision by sutures and sticking plaster.

But though so simple, it is most dangerous. Wounds of the peritoneum of the simplest kind, though not necessarily and invariably fatal, are very frequently so. In most cases, inflammation of the serous membrane has followed, and in very many it has terminated in death. There is another source of danger. If the wound in the uterus should not be completely closed by its contraction, hemorrhage to a fatal amount, from the uterine sinuses, may occur, though it is not so frequent as was supposed by the earlier writers.

This appears to have been the cause of death in the cases related by Dr. Cooper and Mr. Thompson.

The formidable nature of the operation, however, only makes it the more necessary to ascertain clearly the grounds upon which it is justifiable.

* A new System of Midwifery, p. 272.

† Midwifery, vol. i. p. 239, 6th Ed.

It is sufficiently evident, from what has been already stated, that the older practitioners performed it unnecessarily; this is proved, I say, by the fact that the same woman bore children afterwards without assistance. Now it is an established axiom in midwifery, that the mother's life is not to be compromised in order to save the child. A certain amount of risk may be fairly incurred, but beyond this, the safety of the mother is to be preferred, and if necessary, the child sacrificed. In no cases where the mother's security can be so purchased, can we be justified in having recourse to the Cæsarean section; but there are cases on record, where the pelvic outlets are so narrowed by distortion, that a mutilated child could not be dragged through.

In Mr. Thompson's case, the antero-posterior diameter of the upper outlet, was only $\frac{7}{8}$ths of an inch. In Dr. Cooper's second case, it was $1\frac{1}{4}$, and the transverse diameter of the lower outlet, only $\frac{1}{2}$ an inch. In Dr. Young's case, the antero-posterior diameter of the upper outlet, was $1\frac{3}{4}$ inches. In a skeleton in Dr. Hamilton's possession, it was only $\frac{3}{4}$ths of an inch.

In one of Dr. Hull's cases (Ann Lee), the conjugate diameter, taken from the symphysis pubis to the projection of the sacrum, was $1\frac{5}{8}$ inches, and from the acetabula to the projection of the sacrum, 1 9-16ths inches on each side. In the other case (Isabel Redman), the passage was narrower, though the deformity was different.

"Out of 80 cases, the operation was necessitated by narrowness of the antero-posterior diameter of the pelvis in 62.

Thus it was	1	inch in	1 case.
	$1\frac{1}{2}$	" in	8 cases.
$1\frac{1}{2}$ to 2	"	in 23	"
2 to $2\frac{1}{2}$	"	in 25	"
$2\frac{1}{2}$ to $2\frac{3}{4}$	"	in 5	"*

It is quite plain that a fœtus ever so much mutilated, could not pass through some of these pelves, nor through any without great efforts.

Dr. Osborn, who was extremely cautious, and had a great horror of this operation, has fixed $1\frac{1}{2}$ inch antero-posterior diameter, by 3 transverse, as the smallest space through which a child, after evacuation of the contents of the cavities, and the breaking up of the cranium, could be extracted by the crotchet; but others have deemed this impossible. Certainly great risk of injury to the soft parts of the mother, would be incurred by the force necessary to drag the fœtus through so small a space, not quite, perhaps, but nearly equal to that resulting from the Cæsarean operation.

We may, therefore, safely conclude that when from any cause the antero-posterior diameter of the upper outlet, or the transverse diameter of the lower, is not more than $1\frac{1}{2}$ inches, there is no possibility of delivery "per vias naturales," but that we must have recourse to the Cæsarean section.

562. Statistics. — But it may fairly be asked, what chance does so serious an operation afford to either mother or child? The only mode of answering this question, is by adducing the evidence on record. The following tables contain a list of British and American operations, successful and unsuccessful.

* Velpeau, Traité des Accouch. p. 457.

I. SUCCESSFUL CASES.

No.	Date.	Operator, or Authority.	Patient's name.	Hours in Labour.	Cause.	Results to Mother.	Results to Child.	References.
1	1739	Mary Dunally, Midwife,	Alice O'Neal	12 days	. .	rec.	dead	Ed. Med. Essays, vol. v. pt. 1, p. 439.
2	1793	Mr. Barlow	Jane Foster	5 days	distortion	rec.	dead	Med. Rec. and Res. p. 154.
3	1822	Mr. Cellen, New York	. .	. .	distortion	rec.	saved	New York Journal, Mar. 1823.
4	1827	Dr. Richmond, Ohio, Amer.	. .	. .	. .	rec.	saved	Western Medical Journal, Nov. 1827.
5	. .	Mr. Knowles, Manchester,	. .	. .	. .	rec.	.	Transactions of Prov. Assoc. vol. iv.
6	1833	Mr. Greaves, Rockingham	. .	. .	distortion	rec.	saved	Lancet, 1833–4, p. 148.
7	1835	Mr. Gibson, Philadelphia, Amer.	. .	. .	. .	rec.	saved	American Jour. of Med. Science, May, 1835.
8	1838	Ditto	. .	same	. .	rec.	saved	
9	. .	Dr. Fox	. .	. .	. .	rec.	.	
10	. .	Ditto	. .	. .	. .	rec.	saved	Lancet, March 28, 1840.
11	. .	Dr. Wright	. .	. .	. .	rec.	saved	Lancet, 1833–34, p. 148.
12	1845	Mr. Goodman	Mrs. Sankey	5 days	. .	rec.	saved	Ranking, vol. vii. p. 239.
13	1847	Dr. Henderson, U. S.	. .	. .	. .	rec.	putrid	Ranking, vol. v. p. 293.
14	1849	Dr. Radford	Mrs. Haigh	3 days	. .	rec.	saved	Prov. Med. and Surg. Journ. Aug. 22, 1849.

II. UNSUCCESSFUL CASES.

No.	Date.	Operator, or Authority.	Patient's name.	Hours in Labour.	Cause.	Results to Mother.	Results to Child.	References.
1	1737	Mr. R. Smith, Edinburgh	Paterson .	7 days	. .	died	dead	Smellie's Midwifery, vol. iii. p. 423.
2	. .	Professor Young	. .	. .	. .	died	alive	MSS. Lectures.
3	. .	Ditto	. .	. .	. .	died	alive	Ditto.
4	1740	Dr. White, Manchester	. .	. .	. .	died	dead	Hull's first letter.
5	. .	Mr. Wood, Edinburgh	. .	. .	. .	died	dead	Ditto.
6	1769	Mr. Thompson, London	Mar. Rhodes	24 hours	. .	died	alive	Medical Obs. and Enq. vol. iv. p. 261.
7	1774	Dr. Cooper, London	Eliz. Foster	2 days	moll. ossium	died	alive	Ibid. vol. v. p. 218.
8	1774	Mr. Chalmers, Edinburgh	Eliz. Clarke	12 days	. .	died	alive	Hamilton's Outlines, p. 339.
9	1775	Mr. Whyte, Glasgow	. .	. .	. .	died	dead	Hull.

[Table continued on next page.]

II. UNSUCCESSFUL CASES—CONTINUED.

No.	Date.	Operator, or Authority.	Patient's name.	Hours in Labour.	Cause.	Results to Mother.	Results to Child.	References.
10	1777	Mr. Atkinson, Leicester	El. Hutchinson	8 days	moll. ossium	died	alive	Hull, p. 67.
11	. .	Mr. Clarke, Wellingborough	. . .	3 days	. .	died	dead	Mem. Med. Soc. vol. v
12	1794	Dr. Hull, Manchester	Isabel Redman	12 hours	moll. ossium	died	saved	First Letter, p. 162.
13	1798	Ditto.	Ann Lee .	10 days	. .	died	dead	Ditto. p. 172.
14	1795	Dr. Hamilton, jun., Edinburgh	Jean Douglass	2 days	malacosteon	died	alive	Outlines.
15	1798	Mr. Kay, Forfar	. . .	3 days	malacosteon	died	alive	Hull's letter.
16	1799	Mr. Wood, Manchester	El. Thompson	. .	distortion	died	saved	Mem. Med. Soc. vol. v.
17	1800	Mr. John Bell, Edinburgh	. . .	. .	. .	died	saved	Med. Chir. Trans. vol. iv. p. 347.
18	. .	Mr. Dunlop, Rochdale	Susan Holt .	. .	. .	died	alive	Hull's Baudeloc. p. 134.
19	. .	Mr. Wood	H. Rheubotham	. .	. .	died	dead	Med. and Phys. Jour. vol. vi. p. 346.
20	. .	Dr. Kellie, Leith	. . .	24 hours	. .	died	dead	Ed. Jour. vol. viii. p. 11.
21	. .	Mr. Kinder Wood	. . .	. .	. .	died	dead	Med. Chir. Trans. vol. vii. p. 264.
22	1817	Barlow and Cort	Ann Hacking	. .	. .	died	alive	Barlow's Essays.
23	1821	Barlow and Dugdale	Mrs. Ridgedale	. .	. .	died	alive	Merriman, p. 317.
24	. .	Dr. Henderson, Perth	Mrs. Lowe .	18 hours	distortion	died	alive	Ibid.
25	1820	Dr. Radford, Manchester	Mary Ashwell	34 hours	distortion	died	dead	Ed. Journal, No. 146.
26	1821	Ditto.	Mary Nixon	19 hours	distortion	died	dead	Ditto.
27	. .	Drs. Douglass and Vanvalsah	. . .	. .	distortion	died	dead	Amer. Med. Jour.
28	1826	Mr. Crichton	. . .	6 days	distortion	died	saved	Ed. Jour. July, 1828, p. 53.
29	1829	Dr. M'Kibbin, Belfast	. . .	. .	exostosis	died	dead	Ed. Jour. Nov. 1831. p. 352.
30	. .	Mr. Ward	. . .	. .	. .	died	dead	Lancet, March 28, 1840.
31	1834	Dr. Montgomery, Dublin	. . .	. .	fibrous tum'r	died	dead	Dub. Jour. vol. vi. p. 418.
32	1843	Dr. Elliott, Waterford	. . .	. .	distortion	died	dead	Letter to the Author.
33	. .	Mr. Whitehead, Manchester	. . .	. .	. .	doubt'l	alive	Ranking, vol. vii. p. 330.
34	. .	Mr. Braid	. . .	. .	. .	dead	dead	Ditto.
35	. .	Messrs. Bailey and Hardy	. . .	. .	. .	dead	dead	Ditto.
36	1845	Mr. Lyon, Glasgow	. . .	. .	tumour	dead	saved	Ed. Mon. Jour. Dec. 1845.
37	1847	Mr. Skey, London	. . .	. .	distortion	dead	dead	Ranking, vol. v. p. 293.
38	1849	Mr. Campbell, Lisburn	. . .	. .	distortion	dead	saved	" vol. x. p. 330.

Thus in British and American practice, out of 52 cases, 14 mothers were saved and 38 lost, or nearly three-fourths.

Out of 49 cases where the result to the child is mentioned, 28 were saved and 21 lost, or 1 in $2\frac{1}{3}$.

In addition, I have collected from foreign authorities 371 cases, out of which 217 mothers recovered and 154 died, or about 1 in $2\frac{1}{3}$.*

Out of 189 of these cases where the result to the child is given, 139 were saved and 50 lost, or nearly one-fourth. Taking the entire number, which amounts to 423, we find that 231 mothers were saved and 192 lost, or about 1 in $2\frac{1}{3}$; and that out of 238 children, 167 were saved and 71 lost, or about 1 in $3\frac{1}{3}$.

The reader will probably be as much surprised as I was myself at the number of operations here recorded. They exceed any hitherto collected, except those published by M. Figueira (*i. e.* 790 cases, of which 424 were fatal). To guard against mistake, I have carefully quoted my authorities in the work referred to, and where these are but secondary, I have consulted the originals, as far as I could obtain access to them.

As to the value of each case, that must depend upon the reporter. I have not felt it my duty to exclude any which are related upon definite authority—my endeavour throughout has been to ascertain that authority as far as possible, and to avoid repetitions. For so much I am responsible, and I trust I shall be found correct.

It may, however, be objected to this catalogue of operations, that many of the cases occurred in the "dark ages" of midwifery, and may, perhaps, have been exaggerated, or invented. I do not know that we can fairly deny their authenticity; but suppose that we admit this, and only take those which have occurred since 1750, the result will still be more favourable than we should have anticipated — for this calculation gives 321 operations, from which 149 mothers recovered, and by which 130 children were saved, and 57 lost, in 182 cases where the result is mentioned.

563. Further: on a good number of these patients the operation has been performed more than once; on some, three and four times. And if we credit the older writers (and I do not know why we should not), we find five, six, and seven times with success.

This is shown in the following table:

* I do not mean that so many mothers were saved from death by the operation, but that they were saved from the effects of the operation. No doubt, many were really saved from death, which could not have been otherwise avoided; but we have proof that many could have been delivered by other means, inasmuch as they afterwards bore children naturally.

In 11 cases recorded in Foreign Journals since my tables were constructed, I find that 6 mothers were saved and 5 lost; 8 children were saved and 3 lost.

No.	Date.	Operator, or Authority.	Patient, or Place.	Number of Operations.	No. of Children saved.	Result to Mothers.
1	. . .	—Guillet . .	. . . .	6 times	6	saved.
2	. .	Le Noir and Lebrun . .	. . . .	3 times	3	recovered.
3	. . .	M. Jobert . .	. . . .	twice	1	do.
4	. . .	M. Peyronnie .	. . . .	twice	. . .	do.
5	. . .	M. Sommius .	his own wife	7 times	. . .	do.
6	. .	A Surgeon at Paris . .	his own wife	5 times	. . .	do.
7	. . .	. . . . .	. . . .	3 times	. . .	do.
8	. . .	. . . . .	at Auçois .	6 times	. . .	do.
9	. . .	Count Nessan .	. . . .	7 times	. . .	do.
10	1775-9	M. Lambron .	. . . .	twice	. . .	do.
11	1797	Mangold and				
12	1801	Burckhardt	L. Mautz	3 times	. .	recovered twice—
13	1805					died after third.
14	. . .	M. Bacqua . .	—Gabery .	twice	. . .	recovered.
15	1796	Rhode and				
16	1810	Somner	. . . .	twice	. . .	do.
17	1802					
18	1805	Lorinzer . . .	—Gröger .	twice	. . .	do.
19	1805 7-11	M. le Maistre, d'Aix . .	—Fauve .	3 times	. . .	do.
20	1817 1819	M. Locher . .	. . . .	twice	. .	recovered once— died second time.
21	1821 1826	M. Merrem . .	—Viandes	twice	. . .	recovered.
22	1823	M. Bosch . .	. . . .	twice	. . .	do.
23	1823 1825	M. Schenck . .	. . . .	twice	. . .	do.
24	. . .	M. Dariste . .	Martinique	twice	. . .	do.
25	1826, 30, 32 39	M. Michaelis .	—Adawetz	4 times	. . .	do.
26	. . .	M. Gardey . .	. . . .	twice	. . .	do.
27	1825 1826	Dr. Schmidt. .	. . . .	twice	. .	recovered once— died second time.
28	1824 1826	Dr. Engeltrum .	Amsterdam	twice	2 saved	recovered once— died second time.

564. After a careful examination of the cases on record, I think we may fairly conclude, that as so many women have recovered from the operation, *it does afford a chance to both mother and child, and that therefore we may be justified in having recourse to it; but that, as the danger is much greater than from any other operation, we should not be warranted in performing it, if there were a prospect of success by other means.*

This, then, constitutes the sole *advantage* of the operation, that in *cases where we cannot deliver the patient by any other means, and when, consequently, both mother and child would inevitably die, if left unaided, we may afford each a chance by performing the Cæsarean section.*

It has no *comparative* advantages, being itself the ultimate standard by which the other operations are to be estimated, and which are valuable, inasmuch as they afford a means of escape from this more formidable one. In this point of view I must not omit noticing one, which although not available in any case to which we are called at the time of labour, may

prevent the necessity of a second operation. I allude to the artificial induction of premature labour, or of abortion. Whenever the diameters of the pelvis are so reduced as to render the extraction of a mutilated fœtus impossible, or even hazardous, I conceive that it would be grievous neglect of duty (if we have a voice in the matter) not to propose this alternative. It is true that by this operation the child will be lost, but the mother will in all probability be saved; and the bare chance of saving the child by Cæsarean section, can never compensate for the additional risk to the mother.

565. The *disadvantages* of the operation will be easily gathered from what has been said; they are mainly, the great risk of hemorrhage or of fatal peritonitis to the mother, and the small chance afforded to the child; these constitute the *objections* to the operation.

That these are very serious objections cannot be denied, nor that they would be insurmountable, had we any other mode of delivery. But when we consider that the only choice is between this operation, which does afford some chance, and certain death to both mother and child, we cannot, I think, hesitate about running the risk.

Doubtless, however, the dangers of the operation should make us pause, and carefully examine the facts of the case, with the aid of the experience of others, before we decide upon this proceeding. In the present day it would be an indelible disgrace to an accoucheur, that his patient, after recovering from the Cæsarean operation, should bear children without assistance.

566. The *cases suitable for the operation* are not very numerous.

1. When the pelvis is so distorted from any cause, that the diameter of the upper or lower outlet is reduced to an inch and a half or two inches, it may be considered impossible to extract a mutilated fœtus; or, if possible, it must be with so much force as to entail the death of the mother.

The operation is equally necessary under these circumstances, whether the child be alive or dead, and it may also be required (in consequence of mollities ossium) after several children have been born naturally.

2. Morbid growths from the periosteum, which offer a fixed and permanent obstacle, may so much reduce the calibre of the passage as to render this operation necessary. This was the case with the patient of my friend Dr. Montgomery.

But before we decide upon the necessity for this mode of delivery, we must be quite sure that the obstacle can neither be displaced nor reduced in volume; and this can seldom be determined until labour commences.

3. In some cases of ruptured uterus, when delivery is imperative, but impossible "*per vias naturales*," Cæsarean section has been recommended. It appears to me that the additional risk from the operation, renders its propriety very questionable.

4. The operation has been performed successfully in cases of extra-uterine fœtation, where the continued presence of the fœtus in the abdominal cavity threatened the mother's life.

5. In case of the sudden death of the mother, Cæsarean section may be performed for the purpose of saving the infant. Many successful cases are on record.

6. If, towards the end of pregnancy, the uterus be wounded extensively, Dr. Hull conceives the Cæsarean section necessary.

Of course the operation will be useless, unless the woman have arrived at that period of pregnancy when the child is "viable."

It will also be in vain if much time have elapsed after the death of the mother. Dr. Jackson, however, recovered an infant half an hour after the death of the mother.

7. Authors have mentioned other cases to which the operation was applicable, as in occlusion of the vagina, scirrhus uteri, &c.

But these do not appear to me adequate grounds for so serious an operation.

567. The best *period for the performance* of the operation appears to be at the commencement of labour, provided there be no doubt of its necessity. The strength of the woman is then unimpaired, and she can not only support the operation better, but has greater prospect of escaping subsequent inflammation.

It is supposed, and I think not without foundation, that the ill success which has attended the operation in this country, is owing to the late period at which it has been undertaken.

In Mr. Thompson's case, it was performed 24 hours after the commencement of labour; in Dr. Cooper's, 12 hours; in Mr. Chambers' case the labour had lasted 12 days; in Dr. Hamilton's, more than 2 days; in Mr. King's, more than 3 days; in Mr. Atkinson's, nearly 3 days; in one of Dr. Hull's (Isabel Redman), 12 hours; in the other (Ann Lee), 10 days; in the case of Mary Dunally, 12 days; in Mr. Barlow's case, 5 days.

Dr. Hull proposes to operate as soon as the os uteri is dilated, and before the membranes burst.

De Graafe advises the operation to be performed just after the rupture of the membranes, and the commencement of the expulsive pains.

568. Method of Operating.—Having determined upon the necessity, and the proper period for the operation, the next subject for consideration is the best mode of performing it. Very little alteration has taken place in this respect since the earlier writers.

The bowels and bladder are to be evacuated, and the patient placed on her back, upon a table covered by a mattress. Her fortitude must decide upon the necessity for restraint, and its amount.

Before commencing the operation it will be proper to ascertain (by the stethoscope) the situation of the placenta, or, at least, that it is not in front.

The incision through the integuments must then be made, either vertically, through the linea alba—obliquely, on the outside of the rectus muscle—between that muscle and the spine—or horizontally, beneath the umbilicus. The latter is the best, if the patient be deformed. It should be about eight or ten inches in length, and when vertical, it may be commenced a little above the umbilicus and terminate near the pubes.

This incision should divide the parietes of the abdomen down to the peritoneum, which is then to be cautiously punctured, and a director, or the finger, inserted into the wound, so as to avoid injuring the intestines, and the peritoneum divided.

The uterus will now be exposed, and an incision must be made into,

but not through its parietes, of the same length as that through the abdominal parietes. This incision must be cautiously deepened, until the membranes are exposed. A slight opening must then be made in them, and some of the liquor amnii removed, by small pieces of sponge. It has occurred to me that this might most readily be effected by a syringe. The object in view is to prevent effusion into the abdominal cavity. By Lauverjat and others we are recommended to rupture the membranes previously. The opening is then to be enlarged, and the infant withdrawn, the funis tied, and the placenta and membranes removed.

The remaining liquor amnii, with any blood which may have escaped, must be removed from the cavity of the uterus, and the operator should make sure that the os uteri is pervious for the escape of the lochia.

No sutures are required in the uterus; as it contracts, the wound will be reduced to about 1½ to 2 inches in length, and the lips will come into apposition, if it be healthy. It is only in cases where they do not do so, that there is anything to fear from hemorrhage. When the uterus is diseased, the wound does not close perfectly, and of course, union cannot take place.

The abdominal cavity is next to be lightly sponged, to remove any blood which may have escaped, and then, the intestines being retained "*in situ*" by an assistant, the lips of the external wound are to be closed by so many sutures as may be necessary.

Dr. Munro, of Edinburgh, advised "that in performing the Cæsarean operation, we should be careful that the viscera be exposed as little as possible; and that the sides of the wound should be kept contiguous by a greater number of stitches than are commonly employed in wounds, in order to exclude the air from the cavity of the abdomen.

In addition to the sutures, straps of adhesive plaster may be applied. and over all I would suggest Dr. Macartney's water-dressing.

The patient must then be placed in bed, and the utmost quiet observed. Cordials will probably be necessary during and after the operation; and when the patient is settled in bed, an opiate may be given.

As a variation from this mode of operating, I may mention Dr. Aitken's suggestions of performing it "while the parts are immersed in tepid water, so as to exclude the air," and so, perhaps diminish its fatal effects. I do not know that this plan has ever been tried.

569. The *difficulties* of the operation are not great. With a little care, we may avoid that part of the uterus to which the placenta is attached, and which is the most vascular, as the stethoscope, previously applied, will indicate whether it is situated anteriorly or not. Caution will also avoid wounding the child when dividing the uterus.

In approximating the lips of the external wound, the intestines are sometimes troublesome, and it is of importance not to include any, as that would add the dangers of strangulated hernia to the unavoidable risk of the operation.

The principal *dangers* of the operation are—

1. Hemorrhage, from the incomplete closure of the wound in the uterus.

2. Strangulation of a loop of the intestines, either in the wound of the uterus, or in the external wound; although due attention will avoid this danger altogether.

3. Subsequent inflammation of the uterus and peritoneum.

The patient may die of the shock within a few hours, or her strength may be exhausted by hemorrhage into the abdominal cavity; but if she survive for a day or two, her death will then probably be owing to inflammation.

570. *Subsequent Treatment.* — The most incessant care and attention will be required. The water-dressing should be continued, and it may be as well to administer small doses of calomel and opium.

On the first appearance of inflammation at the edges of the wound, leeches should be applied along it, and if there be tenderness, a considerable number should be applied over the abdomen, and repeated if necessary, and the doses of calomel and opium increased.

CHAPTER XV.

OBSTETRIC OPERATIONS. 7. SYMPHYSEOTOMY.

571. But one more operation remains for consideration, and I should have omitted it altogether, had I not felt it as as much a duty to point out its inapplicability, as the suitability of the others to the cases for which they were intended. I do not for a moment wish to undervalue the humanity which desired to substitute a minor operation for one so formidable as the Cæsarean section. But when the results of experience support the opinion of the wisest and best midwifery authors, it would be criminal neglect did I not adduce the objections to this operation in their strongest form.

First, however, it may be interesting to give a sketch of its history.

M. Sigault, while yet a student, being impressed with the fatal results of the Cæsarean section, conceived that it might be altogether avoided by an artificial separation of the ossa pubis. This notion was based upon the assumed fact, that this joint spontaneously separates in difficult labours. This has been asserted over and over again by the older writers, and upon this assumption Sigault based his experiments upon the dead body.

In the year 1768, he presented a memoir to the Faculté de Médecine on the subject, proposing that the operation should be tried at first upon animals, and then upon condemned criminals. The memoir was referred to M. Ruffel, who reported unfavourably, and the subject was dropped.

However, M. Sigault was not discouraged: he again proposed it in his Thesis, on taking his degree at Angers, and in Paris, on seeking for his license: and as the proposal was communicated to others, and favourably received, it excited a good deal of interest.

In M. Alphonse Le Roi, Sigault met with an able second, and they determined to give the operation a fair trial the first opportunity. This occurred on the 1st of October, 1777, in the case of —— Souchel, who had previously been delivered by craniotomy. She was safely delivered

by the new operation, and a report was immediately made to the Faculté de Médecine, who were requested to appoint a commission to superintend the patient's recovery.

MM. Grandclas and Descemet were appointed to this office, and notwithstanding that the bladder was injured, and the mother barely escaped with life, such was the enthusiasm excited in the Faculté de Médecine by their report, that they lost sight of the calm investigation becoming a learned body, and on the strength of one case — and that not a very satisfactory one — voted medals to MM. Sigault and Le Roi, and procured a pension for the former and for his patient.

The inscription upon the medal was:

1768. Sectionem Symphyseos Ossium
Pubis. Invenit. Proposuit.
A. 1777.
Fecit feliciter
M. Sigault, D.M.P.
Juvat M. Alphonsus Le Roi, D.M.P.

Persons were not wanting to applaud the inventor and his operation, which was characterised as "the result of inspiration," and several practitioners in France and Germany followed his example.

M. Sigault himself operated on four other women, one of whom died, and several of the children. He seems, indeed, to have become less confident in its safety and efficacy; for he refused to perform it unless there was a space of $2\frac{1}{2}$ inches in the short diameter; and before his death, in such a case, he recommended the Cæsarean section.

"It was soon found, however, not to merit the high encomiums bestowed upon it. *Every operation was found to have its victim*, although it was several times performed upon women, whose pelves were either not at all, or very slightly deformed, and who, either before or after the operation, were delivered without any extraordinary assistance — a convincing proof that the operation had been, in these cases at least, unnecessarily resorted to." *

In 1778, he published a "Discours sur les advantages de la Section du Symphyse du Pubis," in which he examines the usual means of assisting difficult labours, and concludes by stating his reasons for preferring Symphyseotomy to the Cæsarean section.

The first persons, I believe, who investigated the propriety and efficacy of the new operation in this country, were Dr. W. Hunter, Mr. Hunter and Dr. Denman. The former published the result of his inquiries in the *London Med. Obs. and Enquiries*.

"The women of Great Britain," says Dr. Osborn, "are therefore under considerable obligations to the late Dr. Wm. Hunter, who, from an accurate mensuration of those pelves where the Cæsarean operation had actually been performed in this country, and of others still smaller, preserved in his museum, has demonstrated the futility of the section of the symphysis as a succedaneum for that operation, or as a certain means of preserving both the mother and child."

He suggested a combination of the Sigaultian operation with craniotomy, as affording the mother a better chance than the Cæsarean section. But, as Dr. Osborn remarks, "Prof. Guerard's case is exactly in point,

* Hull's Second Letter, p. 94.

and confirms by experiment what was to be expected *à priori*. The child's head in that case was opened, after the division of the symphysis had been performed; but the professor was, notwithstanding, foiled in every attempt to deliver, both by the forceps and the crotchet; and the event in the end proved fatal to the mother."*

The next writer who notices the operation, is Dr. Leake, who, in his work on the Diseases of Women, 1781, has a few pages upon this operation, of which he is inclined to judge favourably, though with caution. He answers some of the objections urged against it, but admits that more experience was required.

The operation was performed in the year 1782, for the first and last time in this kingdom, by Mr. Welchman, of Kington, in Warwickshire. The child was putrid, and the mother died; but Mr. Welchman thinks that her death was not caused by the operation.†

Dr. Osborn, in his "Essays on Midwifery," 1783, gives a good historical sketch of the operation, and after a very careful examination into the merits of it, he arrives at the conclusion that "*no circumstance whatever, real or imaginary*, can ever render it a warrantable operation."

Mr. Dease, in his "Observations in Midwifery," 1783, disapproves of the operation. He says, it was "of worse consequence than the Cæsarean; as it subjected the woman to all the dangers of the latter, without the same advantages of saving the child."

Dr. Hamilton, sen., in his "Outlines of the Theory and Practice of Midwifery," 1784, doubts the efficacy of the operation, and points out its hazard.

Dr. Aitken, "Elements of Midwifery," 1784, says that the operation may be useful "when about half an inch of addition to the short diameter (of the pelvis) is sufficient to allow delivery."

Dr. Hull, in his First Letter, 1790, points out the inadequacy of the operation; and in his Second Letter, enters more fully into the history of it, and shows that the combination of symphyseotomy with craniotomy (first proposed by Dr. Hunter, and repeated by Mr. Simmons) is worse than the Cæsarean section.

Dr. Denman, in his "Introduction to Midwifery," objects to the operation, except, perhaps, in a case where the life of the child (it being alive) was of such immense importance to the nation, that the mother might fairly run the risk.

By every modern British writer the operation is denounced, and is not likely ever to be again attempted in this country.

The contagion of enthusiasm spread rapidly among the French, though some more cautious and philosophical writers held aloof, and others decidedly disapproved of the new operation.

It has not, however, even in more modern times, been so completely discouraged as we might have expected from the results of the cases in which it has been employed.

The operation has been performed in Italy. It has also been modified by Prof. Catolica, after the suggestion of Desgranges and Champion. Instead of dividing the symphysis, the ossa pubis were cut through, nearer their junction with the ossa ilia, and by this means a positive increase in

* Essays in Midwifery, pp. 282, 323.

† Lond. Med. Journal, 1790. Hull's First Letter, p. 138.

the antero-posterior diameter was gained. M. Galbiati performed this operation in 1819, and it proved fatal.

In Germany, it was at first highly extolled; but the general opinion afterwards was unfavourable to its utility. Indeed, it would be astonishing to find any candid man who could resist the evidence afforded by the cases in which it has been tried.

572. Statistics.—49 cases have been recorded; of these 16 mothers died, or about 1 in 3 out of 40 cases; the child was born alive in 11, and dead in 19, or 1 in 2.

I shall not give these cases in detail, but a slight analysis may show more fully the slight ground the advocates of the operation had for exultation.

1. It was performed unnecessarily in four cases, as was proved by a subsequent natural delivery.

2. Without any cause in one case, the patient having borne children naturally, and there being no deformity; and in another, where there was sufficient space.

3. Without the possibility of benefit from it in one case, where the antero-posterior diameter was only $1\frac{3}{4}$ inch.

4. Although 33 mothers recovered, 10 children were lost, 14 saved, and 1 much injured. Of 7 nothing is stated. Of the 16 mothers who were lost, 5 of their children only were saved; 9 were dead, 1 much injured, and of 1 nothing is stated. So that,

5. In the latter case, 16 mothers were sacrificed to save 5 children.

6. Again, although 33 mothers recovered, yet to save 14 children they paid very dearly—for 1 had the bladder and urethra injured; 2 had incontinence of urine; 3 had prolapsus uteri. In 1, the bones of the pelvis exfoliated, the cervix uteri and posterior part of the bladder were gangrenous; and several were endangered by the operation, whilst of a great number no details are given.

We shall now examine the merits of the operation a little more minutely.

573. The *object of the operation* is to increase the short diameter of the pelvis, by the enlargement of the arch formed by the ossa ilia and pubis, so as to allow of the passage of the child in cases where it must otherwise have been extracted through an artificial opening; and by this means afford a greater chance of life, both to the mother and child.

574. The *nature of the aid* afforded is easily comprehended, though the amount is altogether overrated by the early advocates of the operation. The cartilage of the symphysis pubis being divided, the pressure of the head, or the assistance of the operator, may separate the ossa pubis, at the expense of some of the sacro-iliac ligaments; for the separation of the ossa pubis will be *exactly in proportion to the yielding of the sacro-iliac synchondroses;* so that, if the latter were anchylosed, the operation would fail altogether.

Again, it must be remembered, that owing to the posterior situation of the sacro-iliac synchondroses, the space gained will be *mainly in the oblique diameter of the pelvis; next to this in the transverse, and least of all in the antero-posterior diameter.*

But it is from the *last mentioned diameter* being too short that the difficulty exists, and therefore *upon the amount gained in it*, depends the successful issue of the operation.

The entire question turns upon this point. *If by the separation of the ossa pubis so much space be gained as will make up the difference between the sacro-pubic diameter in a deformed pelvis, and the same diameter in an ordinary one, then the operation is, at least mechanically, adapted to the object in view.*

Hence it is very important to ascertain as nearly as we can, how much may thus be added to the antero-posterior diameter. We know from Sigault's and Le Roi's case, that the ossa pubis may be separated four inches: how much will this increase the short diameter?

Dr. Bentley, in his dissertation, quotes the experiments of Ripping of Paris, and Lobstein of Strasburgh, in support of the conclusion that the utmost gain by the operation is *four lines* in the short diameter, and Dr. Aitken says *half an inch.*

I feel satisfied myself that *half an inch* is the very utmost that can be gained, except by such violence as would be utterly unjustifiable.

But then Dr. Leake observes that the head will press into the opening, and "it will therefore follow that as much of the occiput, or hind head, as is intruded into an aperture at the pubis of two inches and a half, so much precisely will be the space gained by this operation, and superadded to the short axis of the pelvis from sacrum to pubis, which will be equal to the enlargement from side to side — the circumstance here contended for."

This is undoubtedly ingenious, but not quite correct, inasmuch as the long diameter of the head at the upper outlet corresponds with *one of the oblique* and *not with the sacro-pubic diameter;* so that the occiput would correspond pretty nearly with the acetabulum, and the tuber parietale with the interval between the ossa pubis. In this situation, no part of the head could pass through the opening, unless the operator changed its position. Further, Dr. Osborn has justly remarked, that this pressing into the opening would be at the expense of so much injury to the bladder and soft parts, as would render the operation unjustifiable.

575. The *advantages* of the operation, as enumerated by its supporters, are:

1. That it substitutes an operation of less danger for the Cæsarean section; but, this, we have seen, is not true, for although 1 in 3 of the mothers only are lost by it (rather less than by the Cæsarean section), yet those who recover are liable to accidents which fully counterbalance this slight advantage.

2. That it affords a better chance of saving the child; but we have seen that only one-half of the children were saved, whilst by the Cæsarean section, more than two-thirds were preserved.

3. That it is a less painful operation. This is true as regards the period of operating; but if the period of convalescence be included, with the sequelæ which occasionally occur with each, I should doubt the fact.

4. "The section of the pubes which allows the child to be born by the natural passage, carries not with it those ideas of cruelty which the Cæsarean operation does, where the patient is, as it were, embowelled alive." (*Leake.*)

This is very plausible but very false humanity.

576. The *objections* against the operation are to my mind unanswer-

able, although some that have been put forward as such have been refuted by experience. It must be remembered that the operation is contemplated for those cases in which the Cæsarean section would otherwise be necessary.

1. For these cases the operation is inadequate. In a former chapter, we have seen that the Cæsarean operation ought not to be performed in any case where the antero-posterior diameter is more than 2 inches, inasmuch as the delivery can be accomplished by a less hazardous method. Now as the Sigaultian operation adds but half an inch (at the utmost), this would increase the antero-posterior diameter to $2\frac{1}{2}$ inches. But it has been ascertained that a living child cannot pass through a pelvis whose short diameter is less than 3 inches; consequently, the Sigaultian section cannot avail in these cases, unless craniotomy be superadded. But the mortality of the two would be greater than that of the Cæsarean section, for 1 in 3 of the mothers would be lost, and all the children, by the combined operations; whereas by the latter, although 1 in $2\frac{1}{4}$ of the mothers are lost, more than two-thirds of the children are saved.

2. Even if the space gained would secure the delivery, the mortality of mothers and children would not justify its preference to the Cæsarean section — especially if we take into account the sequelæ.

These objections appear to me quite conclusive against the operation; but as others have been adduced, it may be as well to enumerate them.

3. The cartilage of the symphysis may be ossified; which will render the operation impracticable, even after it has been commenced.

4. Great injury may be inflicted by the knife on the bladder or soft parts within the pelvis.

5. Equal injury may happen from the violence used in separating the ossa pubis.

6. The soft parts may be injured by pressure against the edges of the divided ossa pubis.

7. The sacro-iliac synchondroses may be ruptured past remedy.

8. The divided cartilages may not unite. Experience, however, has shown the groundlessness of this objection.

9. The admission of external air may excite inflammation.

These latter objections have of course a certain weight, but hardly sufficient to prohibit the operation, if it were adapted for the cases for which it has been proposed.

But there is another class of cases for which it would seem at first sight more suitable, and which indeed appear to have been contemplated, by those who recommend its performance, where the antero-posterior diameter of the upper outlet is three inches. I mean those cases, where the difficulty is too great for the forceps, and in which (as we have seen) craniotomy is necessary. Here the gain of half an inch might enable a living child to pass. But the operation is objectionable in these cases, because of the results; for, independent of the ill consequences to those who recover, we find that 1 in 3 of the mothers die, and only half of the children are saved; whilst, although all the children are sacrificed by craniotomy, only 1 in 5 of the mothers die.

And it must also be borne in mind, that these results of craniotomy have occurred under more unfavourable circumstances than those of the Sigaultian operation.

577. From these considerations, I trust that my readers will agree with me in the following conclusions:

1. That the Sigaultian operation is undeserving of the encomiums passed upon it, inasmuch as it offers no increased chance of safety to the mother or child — the statistics of the cases in which it has been tried having shown that 1 in 3 of the former, and one-half of the latter are lost; besides that in those of the mothers who recover, much inconvenience is experienced from the sequelæ of the operation.

2. That it is perfectly inadmissible as a substitute for the Cæsarean section, because the utmost space gained by it would not permit the child to be born alive in any case in which the Cæsarean operation *ought to be* contemplated; and if the child must in addition be destroyed, the combined mortality of the mothers and children would then be far greater than from the Cæsarean operation.

3. That it is equally inadmissible as a substitute for craniotomy alone, in cases where the forceps are inadequate, because the consequences to the mother are more serious from it than from craniotomy.

578. If, as I believe, these conclusions are correct, I need only add an account of the mode of performing the operation, not as a model, but to complete its history. Perhaps the best mode of doing this, is to give the account of one of M. Sigault's cases, abridged by Dr. Osborn.

"Mons. Sigault, with a common bistoury, cut through the integuments and linea alba, beginning the operation at the upper and central part of the symphysis pubis; then introducing his fore-finger as a director, he cut through the ligaments and cartilage; immediately on the completion of which, the two ossa pubis, with a peculiar noise, spontaneously separated two inches and a half: this was demonstrable, for M. Le Roi laid his four fingers into the opening. M. Sigault immediately introduced his hand into the uterus, broke the membranes, and brought down the feet. M. Le Roi accomplished the delivery. The whole operation, both section and delivery, was finished in five minutes. The child was born alive. A ligature was passed round the body of the mother, to keep the pelvis firm. The patient having no bad symptoms, was left till the next day, when every circumstance continued favourable; she had passed her urine voluntarily twice, there had been no hemorrhage, and she had suffered little pain."

Having entered thus fully upon the operations proposed for the relief of the previous classes of unnatural labour, we may now resume the consideration of the remaining deviations from natural labour.

CHAPTER XVI.

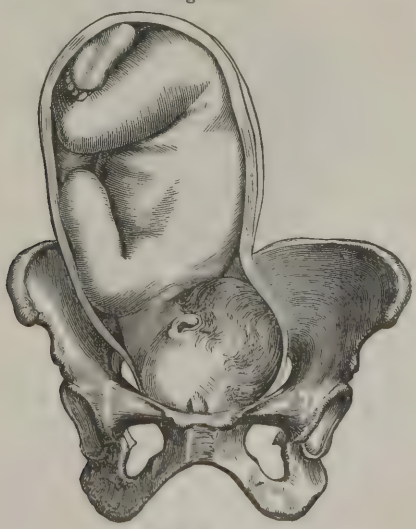
PARTURITION. CLASS II. UNNATURAL LABOUR. ORDER 5. MAL-POSITION AND MAL-PRESENTATION OF THE CHILD.

579. We have already investigated those cases of unnatural labour which arise from defective uterine power, and from an abnormal condition of the passages. The only class of deviations which remains, is that which is caused by some peculiarity on the part of the child. In these cases we assume that the uterine power is intact, and that there is no impediment in the passages. The difficulty is a purely mechanical one; but if it be not removed after a certain time, the constitution is involved, and the characteristics which we noticed in powerless labour, present themselves. Thus, as in the case of defective passages, that which at first was purely local and mechanical, involves at length the vital powers and the constitution of the patient.

We shall first notice certain mal-positions. 1. Face presentations, as they are called; and, 2, those cases in which the forehead emerges under the arch of the pubis.

580. Mal-position. 1. Face Presentations. At first sight it may seem strange to call a "face presentation" a mal-position; but a moment's thought will show that when the face is placed across the upper outlet, it is merely because, from some cause, the head which presented has deviated from its usual mode of descent. Dr. F. Ramsbotham remarks, "I am inclined to think that most of the face presentations we meet with in practice, were originally brow presentations, and have been changed by the action of the uterus in the way I have already specified." In face presentations the head is bent backwards, so as to place the face nearly flat across the brim of the pelvis in its oblique diameter.

Fig. 122.

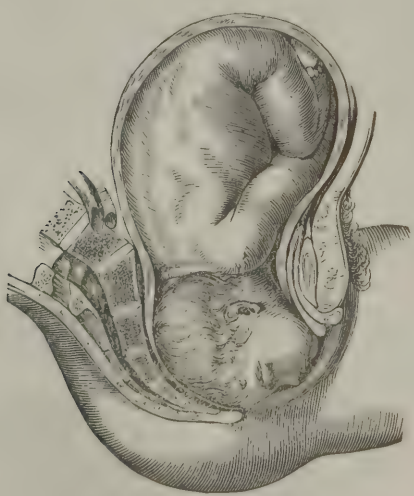


581. Mechanism. — The face may present in two positions, according as the forehead is towards one or other os ilium. In the *first position*, the forehead is towards the left ilium, or rather the left acetabulum, and the chin towards the right ilium, or right sacro-iliac synchondrosis, the bridge of the nose representing the line described by the sagittal suture in the first cranial position (fig. 122). The right side of the face is anterior, and being anterior is more depressed than the other upon entering the brim, so that, on making an examination, the finger touches the right eye or the zygoma, and upon this part the primary tumour forms. M. Naegelè remarks that there forms "a swelling, first upon the upper part of the right half of the face, which in this species of face presentation (*first position*) is always situated lowest." If the progress of the head through the external passages be unusually rapid, this is the only tumefaction observed; but if it advance slowly, and the head remain a long time in the cavity of the pelvis before it actually enters the vagina, the inferior half of the right side of the face, viz. part of the right cheek, will be remarked after birth as being the principal seat of the swelling."

The head, as we have said, enters the brim obliquely as to its diameter and plane, and thus descends into the cavity; when there, the chin makes a turn from right to left, and so emerges obliquely under the arch of the pubis (fig. 123), whilst the vault of the cranium sweeps over the perineum.

This first position is by far the most frequent.

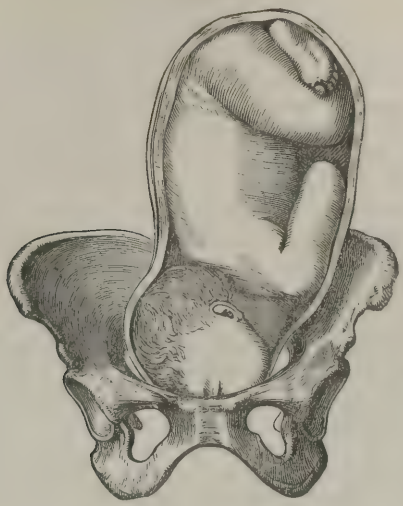
Fig. 123.



The *second position* is the reverse of the first: the forehead is turned towards the right acetabulum, and the chin to the left sacro-iliac synchondrosis (fig. 124). The primary tumour forms on the upper part of the left cheek, and the secondary (if there be two) on its lower part; the face enters the cavity obliquely, and so emerges from the outlet; but the chin makes a quarter turn from left to right anteriorly, and when expelled is under the arch of the pubis, whilst the head sweeps over the pelvis.

The older writers describe the head as emerging from the lower outlet in face presentations, with the chin towards the perineum; and Dr. Smellie has given a plate in illustration of this. A moment's examination

Fig. 124.



will show that this is mechanically impossible, and the careful observation of Naegelè and others has been unable to detect any such case.

582. Statistics. 1. *Frequency.*

a. British Practice.			*c. German Practice.*		
Author.	Total Number of Cases.	Face presentations	Author.	Total Number of Cases.	Face presentations.
Dr. Jos. Clarke .	10,387	44	MM. Moschner and Kursak . .	12,329	122
Dr. Merriman .	2,947	10	Dr. Carus . .	2,557	24
Dr. Granville . .	640	1	Dr. A. E. v. Siebold	1,003	10
Dr. S. Cusack .	701	3	Dr. E. C. v. Siebold	494	4
Dr. Maunsell . .	839	7	Dr. Kilian . .	9,392	122
Mr. Gregory . .	691	2	Dr. Merrem . .	157	1
Dr. Thos. Beatty .	1,184	4	Dr. Naegelè . .	115	4
Dr. Collins . .	16,414	33	Dr. Klugè . .	799	6
Mr. Lever . .	4,666	24	Dr. Brunatti .	100	2
Dr. Reid . .	3,250	15	Dr. Adelmann .	57	1
Drs. M'Clintock and Hardy . .	6,634	14	Dr. Jansen . .	13,365	15
b. French Practice.					
Mad. Boivin . .	20,517	74			
Mad. Lachapelle .	15,652	65			
M. Ramboux . .	491	3			
M. Dubois . .	10,742	30			

Thus, in British practice, out of 48,353 cases, there were 157 face presentations, or 1 in 308; among the French, 47,402 cases, and 172 face presentations, or about 1 in 275½; and among the Germans, 40,368 cases, and 311 face presentations, or about 1 in 129⅔; the whole giving 640 face presentations in 136,123 cases, or about 1 in 212½ cases.

As to the mode of delivery, and results to mothers and children, I cannot make out a regular table, but must content myself with such scattered notices as I have been able to obtain. Mr. Giffard relates 4 cases: 1 was delivered naturally, and 3 with the forceps; neither mothers nor children were lost. Dr. Smellie gives 19 cases: 3 delivered naturally; 5 by version; 4 by the forceps, and 5 by craniotomy: 3 mothers and 11 children were lost.

Mr. Perfect relates 8 cases: 1 delivered naturally, 2 by version, 4 by forceps, and 1 by craniotomy: none of the mothers, but 2 of the children were lost.

Dr. Jos. Clark performed craniotomy twice in his 44 cases; all the rest were delivered naturally.

Dr. Ramsbotham has recorded 3 cases: 2 delivered by the forceps, and 1 by craniotomy; all the children were lost, but none of the mothers.

Dr. Granville's single case was delivered by version.

Dr. Cusack's 3 cases were delivered naturally; neither mother nor child was lost.

Dr. Collins' 33 cases were all delivered naturally; the mothers were saved, and but 4 of the children lost, 1 of which was an acephalous fœtus.

Of Madame Boivin's 74 cases, we are informed that 41 were delivered naturally, 14 by version, and 2 by craniotomy, but nothing is said of the mortality.

Of Madame Lachapelle's 65 cases, 41 were delivered naturally, 20 by version, and 4 by the crotchet; 7 children are stated to have been lost.

Of Dr. A. E. v. Siebold's 10 cases, 6 were delivered by the forceps.

Of 80 cases under the care of Dr. Boer of Vienna, all but one were delivered without assistance; in that one case the forceps were used. None of the mothers suffered, and 3 or 4 of the children only were lost.*

Thus, so far as our data go, out of 344 cases, 248 were delivered naturally, and 77 required artificial assistance (*i. e.* 42 version, 20 forceps, and 15 craniotomy). In 150 cases where the result to the mother is given, 3 died, or 1 in 50; and of 216 children, 14 were lost, and 15 destroyed, or about 1 in 7.

It is worthy of remark, that the mortality among both mothers and children is greatest when assistance was given; for of Dr. Collins' 33 and M. Boer's 80 cases, delivered naturally, none of the mothers, and but 7 of the children, were lost. These notices show also the change of opinion as to the necessity for assistance.

583. Causes.—It is very difficult to assign correct causes for this mal-position. It may be owing to some shock, coughing for instance, or sudden uterine action, just before the head takes up its permanent position at the brim.

"I have treated," says Dr. Huston, in a note to a former edition, "seven cases of face presentation: four were delivered with the forceps, one with the vectis, and the others without assistance, the children being small. The mothers all recovered, but two of the children were still-born."—Editor.

Dr. Simpson attributes mal-position and mal-presentations generally to the following causes:—

1. Prematurity of the labour; parturition occurring before the natural position of the fœtus is established.

2. Death of the child in utero; or, in other words, the loss of the adaptive vital reflex actions of the fœtus.

3. Causes altering the normal shape of the fœtus or contained body, or causes altering the normal shape of the uterus or containing body, and thus forcing the fœtus to assume, in its reflex movements, an unusual position in order to adapt itself to the unusual circumstances in which it happens to be placed.

4. Præternatural presentations are occasionally the result of causes physically displacing either the whole fœtus or its presenting part, during the latter periods of gestation or at the commencement of labour.

584. Diagnosis. — "The presentation of the face," says Dr. Denman, "is discovered by the general inequalities of the presenting part, or by the distinction of the particular parts, as the eyes, nose, mouth, or chin." There is no very great difficulty in making out this presentation before tumefaction takes place; but afterwards it may be mistaken for the breech, unless we are very careful. The bridge of the nose will be the best guide, as being prominent, firm, and unlike any part of the breech. The eyes or mouth may be confounded with the anus, and the malar bone with the tuber-ischii.

585. Symptoms. — The only effect which a face presentation has upon labour is to retard the second stage, but not to such an extent, or very rarely, as to give rise to unfavourable symptoms. The resistance to be overcome is greater, because the bones of the face and base of the cranium which pass the first through the brim, cavity, and outlet are incompressible, and because there is not the same power of adaptation; but the impediment only calls forth more energetic action on the part of the uterus, and we perceive that the progress of the labour, if slow, is still evident. The suffering, of course, is more severe, as well as more prolonged.

The child when born is a frightful object in most cases; one eye closed, and the half or the entire of one cheek swollen, red, and contused; but these injuries speedily pass away, and in a day or two the face assumes its ordinary aspect. I should mention, that if a rough and careless examination of the presenting part be made in these cases, the eye may be seriously damaged, or even destroyed. The mortality amongst the children is rather more than in head presentations, but less than in any other mal-presentation.

If, as is very rarely the case, the delay should be excessive, the symptoms of powerless labour (§ 413) will be developed, and will call for prompt relief.

586. Treatment. — Formerly, when this mal-position was regarded as an unnatural presentation, it was held necessary or advisable to deliver the patient by art without loss of time, as appears from the statistical results of the operation. M. Portal appears to have been the first to suspect that nature might be adequate to the delivery, and Deleurye concurred in this opinion. M. Boer, in 1793, objected to any interference; and of late years it has been established as a rule, that assistance is unnecessary merely on account of the mal-position. If there should be any dispro-

portion between the size of the head and the pelvis, or the pains should become insufficient, or accidental complications occur, then of course we must have recourse to the *mildest* form of assistance. If within reach, the forceps will probably be the best instrument.

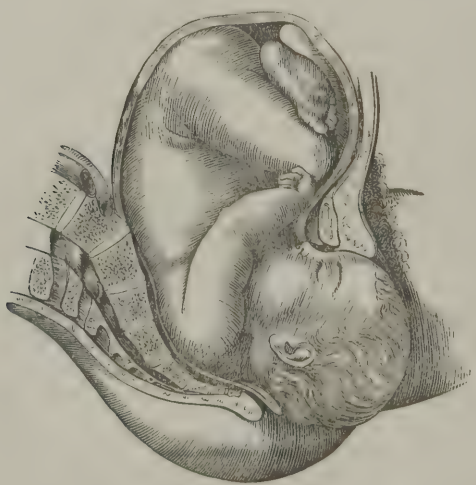
In ordinary cases we must keep up the courage of the patient, and exercise all our own patience and kindness until the delivery be effected.

If there be a difficulty in establishing respiration, after the birth of the child, as from the cerebral congestion there may be, the cord must be divided, and an ounce or two of blood allowed to escape, previously to applying the ligature.

The child's face may be fomented with a decoction of chamomile flowers or poppy heads, and afterwards bathed frequently with a spirit lotion.

587. 2. The forehead towards the arch of the pubis. — When describing the mechanism of parturition, it was stated, that when the head presents in the third or fourth position, it ordinarily changes into the

Fig. 125.



second or first in its passage through the pelvis, but that occasionally, this change of position does not take place, and that the head then passes down through the lower outlet, with the forehead turned obliquely under the arch of the pubis. When there, the head may be forced equally down, if there be room, presenting the longitudinal diameter (a little modified) to the antero-posterior diameter of the lower outlet, or the forehead may remain stationary at the pubis, whilst the posterior part of the head sweeps over the perineum.

588. Statistics. — *Frequency.*

Authors.	Total No. of Cases.	Forehead to Pubis.
Dr. Bland	1,897	5
Dr. Merriman	2,947	44
Dr. Granville	640	2
Dr. Cusack	303	2
Dr. Maunsell	849	7
Dr. Collins	16,414	12
Drs. M'Clintock and Hardy	6,634	15

Thus, in 29,684 cases, the face was turned to the pubis 87 times, or about 1 in 342½.

As to the result to the child; of 22 cases where the result is specified, 9 were lost.

589. Causes.—It is not easy to explain why the ordinary change does not take place. I have observed that it may be prevented if the pelvis be somewhat narrower than usual, and especially if it be funnel-shaped: also, if the pelvis be disproportionately large, as due resistance will then be wanting; and lastly, if very violent pains come on suddenly just after the head has entered the brim. It is probable that other causes may produce similar effects, but they are not so easily detected.

590. Diagnosis. — The mal-position will be detected by the flatter shape of the forehead, which does not fill up the arch of the pubis so well as the posterior part of the head; and especially by the situation of the fontanelles, the large one being anterior, and the smaller one posterior.

591. Symptoms.—The effects of this mal-position upon labour in its second stage are by no means serious; in ordinary cases it causes some delay at the latter part of it, and calls for more expulsive force; but the effort is successful, and the child is expelled. If, however, the pelvis be narrower than usual, it may offer a considerable impediment, as a larger diameter is presented to the lower outlet than in the usual position.

The effect upon the child is generally of no moment, unless the pelvis be so deficient as to require an operation.

592. Treatment.—If the pelvis be not smaller than usual, there is no assistance necessary; and, if we suspect a narrowing, still sufficient time must be allowed to prove whether the relative disposition be such as the natural agents can overcome. If it be not, then, after a due and careful estimate of the obstacle, we must determine whether there is room for the application of the forceps, or whether the only alternative is craniotomy. In some few cases the forceps may be necessary from a failure of the uterine power. The time for operating must be determined by the amount of the obstacle, and the symptoms present.

593. Mal-presentations.—Having taken the presentation of the head as a type of natural labour, we must include the presentation of any other part of the body under the class of mal-presentations. If we were to follow implicitly Baudelocque, and other foreign authorities, there is scarcely any part of the body which may not present; but Denman, Lachapelle, and Naegelè consider that such regions as the back, loins, belly, neck, &c., never constitute the presenting part.

Taking the presentations in the order of their frequency, we shall now inquire into

1. Breech presentations, 1 in 52.
2. Presentations of the inferior extremities, 1 in $92\frac{2}{3}$.
3. " of the superior extremities, 1 in $261\frac{1}{3}$.
4. Compound presentations, where two or more parts present at the brim.

594. Presentation of the Breech.—The breech may present itself at the brim in different positions; but as it enters it will be found to arrange itself so that, 1, the back of the child is turned anteriorly towards the belly of the mother; or, 2, the back of the child shall look posteriorly to the back of the mother. Not that the back of the child is directly anterior or posterior, but oblique; the transverse diameter of the child's hips corresponding to one or other of the oblique diameters of the brim.

"In every case," observed M. Naegelè, "whether the nates have at first a completely transverse or oblique direction, they will always be found, on pressing lower into the superior aperture of the pelvis, to have taken an oblique position, and that ischium which is directed anteriorly to stand the lowest. They pass through the entrance, cavity, and outlet of the pelvis in this position, which is oblique both as to its transverse diameter as well as to its axis."

Thus, in the first and most frequent position, the left ischium corresponds to the left acetabulum, and, being anterior, it is depressed, and presents at the os uteri, so that the finger impinges upon it if it be passed into the centre of the os uteri. In this oblique position the breech descends into the cavity, and this part first passes through the vaginal orifice, and appears between the labia; whilst the other ischium sweeps over the perineum, and the belly of the child is towards the inner surface

Fig. 126.

of the right thigh of the mother. "The rest of the trunk," according to the admirable description of the author just quoted, "follows in this position; and as the breech approaches the inferior aperture of the pelvis, the shoulders pass through its superior aperture in the *left* oblique diameter;

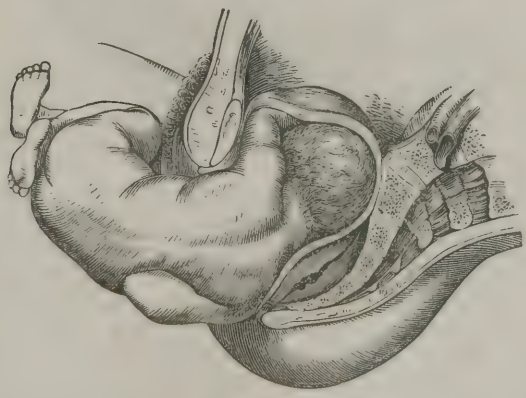
and during its passage (*viz.* the breast) through the pelvic outlet, the arms and elbows, which were pressed against it, are born at the same moment." It is not always the case that the arms are pressed close to the side of the child, one or both may be stretched out above the head, and then, as labour advances, first one will be pressed through the orifice (generally the right), and then the other, or it may be necessary to draw them down.

"But whilst the shoulders are descending in the above-mentioned oblique position, the head, which during the whole progress of the labour rests with its chin upon its breast, presses into the superior aperture in the direction of the *right* oblique diameter (*viz.* with the forehead corresponding to the right sacro-iliac synchondrosis), and then into the cavity of the pelvis in the same direction, or one more approaching the conjugate diameter. After this, it presses through the external passage and the labia in such a manner, that while the occiput rests against the os pubis, the point of the chin, followed by the rest of the face, sweeps over the perineum as the head turns on its lateral axis from below upwards." This brings the occipito-frontal diameter of the head in correspondence with the long diameter of the outlet.

In the second position, the right ischium, corresponding to the right acetabulum, is turned forward and depressed, passing obliquely through the cavity and outlet in the former case, but with the direction of its surface reversed; its anterior surface being directed towards the left side of the pelvis and left thigh of the mother, whilst the head enters in the left oblique diameter.

The tumour (marked by a red or livid spot) will be found on the left or right ischium, according as it was the first or second position.

Fig. 127.



595. M. Naegelè has noticed two deviations from the ordinary mechanism of breech cases which I shall give in his own words. First: "It sometimes happens that the body, which, directed with its anterior surface forwards and to the right, or forwards and to the left, is born as far as the shoulders, turns itself then (and frequently during the course of a single pain, by which it is fully expelled) from the side completely forwards, and

then to the opposite side, so that the anterior surface of the child, which, for instance in the first case, was, before the pain came on, still directed forwards and to the right, will be afterwards instantly, in the twinkling of an eye, situated backwards and to the left." Dr. Collins has noticed this change as rendering the interference recommended by some authors unnecessary.

596. The second deviation is thus described by Naegelè. "It sometimes happens in presentations of the nates, that the head does not rest with the chin upon the breast; but the occiput, as in those of the face, is pressed against the nape of the neck; in this case the passage of the breech through the pelvis, according to which species of nates presentation it may be, follows in the manner already described, as far as the head; this, with the occiput depressed on the nape of the neck, enters the superior aperture with the vertex corresponding to one or other ilium of the mother, and in passing through it, and pressing lower into the cavity of the pelvis, the vertex gradually turns more and more back-

Fig. 128.

wards, so that when the trunk is born, the arch of the cranium is directed to the hollow of the sacrum, and the inferior surface of the under jaw to the internal one of the symphysis pubis. The passage through the inferior aperture takes place in the following way, viz. whilst the under jaw presses with its inferior surface against the os pubis, the point of the occiput, with the vertex, followed by the forehead, sweeps first over the perineum." Thus bringing the occipito-mental diameter of the head into apposition with the antero-posterior diameter of the outlet.

597. Thus, as I observed in speaking of the passage of the head, whether we consider the ordinary or extraordinary adaptation of the diameters in breech presentations, we see at once the admirable way in which the arrangements are calculated to provide for the passage of the child with the least possible waste of space; and it may convince us that in far more cases than we should *à priori* suppose, nature is adequate to the fulfilment of the functions of parturition; and interference, when injudicious, is more likely to impede than to further her efforts.

598. Statistics. 1. *Frequency.*

a. British Practice.

Authors.	Total No. of Cases.	Breech presentations.
Dr. Bland	1,897	36
Dr. Jos. Clarke	10,387	61
Dr. Merriman	2,947	78
Dr. Granville	640	2
Edin. Lying-in Hospital	2,452	17
Dr. Cusack	701	14?
Dr. Maunsell	416	6
Mr. Gregory	691	14
Dr. Collins	16,414	242
Dr. Beatty	1,182	28
Mr. Lever	4,666	59
Dr. Reid	3,250	79
Mr. Warrington	110	4
Mr. French	89	2
Dr. Churchill	1,525	35
Drs. M'Clintock and Hardy	6,634	101

b. French Practice.

Authors.	Total No. of Cases.	Breech presentations.
Mad. Boivin	20,517	373
Mad. Lachapelle	15,652	349
M. Ramboux	491	4
M. Dubois	10,742	391
Hôtel Dieu, Paris,	280	3
M. Mazzoni	452	5

c. German Practice.

M. Richter	2,571	48
Moschner and Kursak	12,329	125
A. E. v. Siebold	1,944	44
E. C. v. Siebold	1,165	18
M. Kilian	2,350	125
M. Naegelè	1,411	76
Dr. Merrem	299	14
Dr. Henne	555	6
Dr. Klugè	1,074	27
Dr. Carus	2,908	43
Dr. Brunatti	295	6
Dr. Theys	28	1
Dr. Adelmann	53	2

Thus in British practice, breech presentation occurred 768 times in 54,001 cases, or about 1 in 70; in French practice 1125 times in 48,134 cases, or about 1 in $42\frac{1}{2}$; and in German practice 535 times in 26,982 cases, or about 1 in $50\frac{1}{2}$; the entire number of breech presentations being 2438 in 129,117 cases, or about 1 in 52.

The following table exhibits the result to the child in as many cases as I could collect:

Authors.	No. of Breech Presentations.	Children lost.
Mr. Giffard	13	4
Dr. Smellie	27	16
Mr. Perfect	9	2
Dr. Jos. Clarke	61	21
Dr. Ramsbotham	14	7
Dr. Merriman	79	9
Edinburgh Hospital	17	5
Mr. Gregory	14	4
Dr. Collins	242	73
Dr. Beatty	28	12
Mr. Lever	59	30
Dr. Churchill	35	14
Drs. M'Clintock and Hardy	80	18

Thus in 678 cases of breech presentation 195 children were lost, or about 1 in $3\frac{1}{5}$.

599. Diagnosis. — The breech of the child is distinguished by its roundness and softness, by the cleft between the buttocks, by the anus, and by the organs of generation; and it would seem unlikely that it should be mistaken for anything else. Yet it may be confounded with a face presentation which has advanced slowly, and where there is much swelling; to the touch there is really a great similarity, but in the latter we have the bridge of the nose obliquely across the os uteri, and in the latter the more or less moveable coccyx may be felt close to the anus, and joining the broader and firm sacrum. This will also distinguish it from shoulder presentations, which might be mistaken for the tubera ischii.

The discharge of meconium is of very little value, as it occurs in head presentations, although in the latter case Dr. Collins remarks, "it comes away in a more fluid state, and has not its natural appearance, being mixed with the discharges from the uterus and vagina."

600. Symptoms. — The duration of the labour varies a good deal; in some cases it is concluded as quickly as if the head descended, in others it is more tedious; there is more delay when the arms are stretched upwards than when they are down by the side. There is also delay in the expulsion of the head, owing to the incompressibility of the base of the skull, which is the first to enter, and its being less able to adapt itself to the brim.

It is very seldom that any bad symptoms arise on the part of the mother, as assistance is generally afforded; but there is danger that mischief may be done, if the interference be not judiciously timed, and gently executed. If there be any narrowing of the brim, there will be proportionate delay; and if the patient be not delivered, the symptoms of powerless labour may be developed.

That there is danger to the child, the statistics I have given prove; more than one in four being lost, and this is owing to the delay in the transmission of the head. The body does not dilate the passages so well as the head, as the head is wider than any part of the body. This of course occasions the head to pass slowly; but besides, a little time is required to allow of the adaptation of the head to the brim, cavity, and outlet, and for such compression as can be made; and as during this time the cord is exposed to pressure, it is not surprising that asphyxia or pulmonary apoplexy should result, of which the child generally dies.

Even where the life of the child is saved, the pressure to which the organs of generation have been exposed may be followed by inflammation and sloughing, according to Denman.

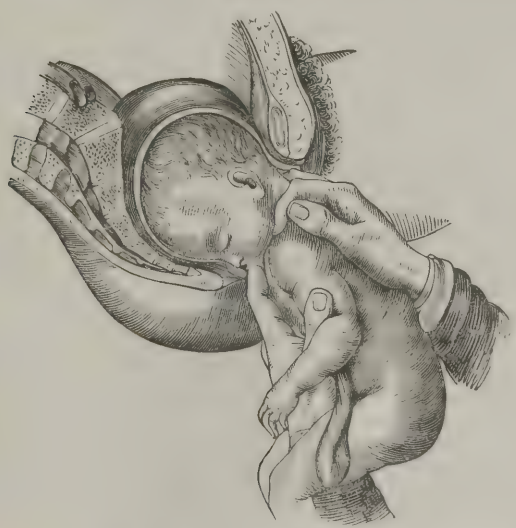
601. Treatment. — A very minute and thorough examination is necessary in these cases, to assure ourselves of the accuracy of our diagnosis; but this once done, the less frequent the examinations are renewed the better, lest the parts should be irritated. As to the actual management, I must repeat what I have said before, that the less interference the better for the patient. Dr. Collins remarks most soundly, "the most common and dangerous error committed by the medical attendant arises from officious and injudicious attempts to hasten or assist during the early stages of labour, than which he could not well adopt a more hazardous course. No interference whatever is required, until the breech shall have been expelled

through the external parts, unless the uterine action be inadequate to effect this; otherwise the child must often be forfeited, owing to difficulty experienced in consequence of the soft parts being badly prepared to admit the passage of the head. This being the most critical part of the delivery, should much delay take place, the continued pressure on the funis speedily deprives the child of life. To guard against this, therefore, the breech should be permitted to pass slowly and unassisted, so as gradually and perfectly to dilate the soft parts, thereby greatly facilitating the completion of the labour."

At the same time as the breech passes, the perineum must be carefully guarded (§ 348) with the left hand, whilst the right is employed in supporting the child as it is expelled, and carrying it forwards and downwards towards the legs of the mother, allowing it perfect liberty to change its position or make such turns as the mechanism may impress upon it. It will rarely if ever be necessary for us to attempt to adapt the child to the passages, as we have seen (§ 595) that even when the head is in an apparently unfavourable position at the brim, it rectifies itself in the cavity. What we must do, is to offer no impediment to their changes.

When the umbilicus appears at the external orifice, the danger from pressure on the funis commences; the cord should be drawn down a little, and removed as much as possible out of the way of pressure. The strength of the pulsations is an important guide as to the necessity for assistance; if they be strong, we can allow time for the natural powers to

Fig. 129.



act; if, on the contrary, they be very weak, we must expedite the delivery as much as possible, consistent with the safety of the mother, by drawing down the body of the child during a pain.

When the chest is through the external parts, the arms may offer a difficulty; if they be close to the side of the child, we shall have no trouble,

but if above the side of the head, they must be brought down by passing one or two fingers over the shoulder as near as possible to the elbow, and then drawing it across the face and chest until the elbow arrives at the external orifice: having extracted one, the other is easily liberated, and it is generally easier to begin with the one nearest the perineum. Great care must be taken not to draw directly downwards, or we may break the arm, but across the front of the child, and neither violently nor suddenly, or much mischief may be done to the soft passages.

When the arms are free, the shoulders will pass out, and the head of the child will take up its position at the brim in the manner described, but here there is a considerable delay. If there be no demand for prompt delivery, and the cord pulsate strongly, it is better not to interfere, and when the head is in the cavity, two fingers of the left hand may be introduced and placed in the mouth or, what is better, on the upper jaw, which, for many reasons, is more suitable than the lower, as usually recommended, and pressure made so as to depress the chin upon the breast; thus presenting a shorter diameter of the head to the lower outlet, and facilitating the expulsion of the head. The body of the child should be carried forward to the thighs of the mother, and extracting force, varying in amount according the exigency of the case, applied to the shoulders, in the diameter of the axis of the lower outlet. "In some few cases," Dr. Collins says, "advantage is derived from pushing up the head a little, so as to alter its position." This manœuvre, when dexterously executed, will generally extricate the head with ease and promptitude if the patient have had children. In these cases it is peculiarly necessary that pressure should be applied over the uterus from the time that the chest is expelled, in order to secure the regular expulsion of the after-birth.

602. But if the uterine power should fail (as in powerless labour), or any circumstances demand speedy delivery before the breech is expelled, one or two fingers should be passed into the groin, and assistance gently and steadily afforded during a pain. The blunt hook is frequently used for this purpose, but it has serious disadvantages, and if used incautiously, the thigh of the child may be fractured. After the breech is born, we may extract by grasping the body of the child, covered with a napkin; and let me impress upon my junior readers, that extracting force to be successful (not to say safe) must always be made in the axis of the brim or outlet at whichever part the resistance may be.

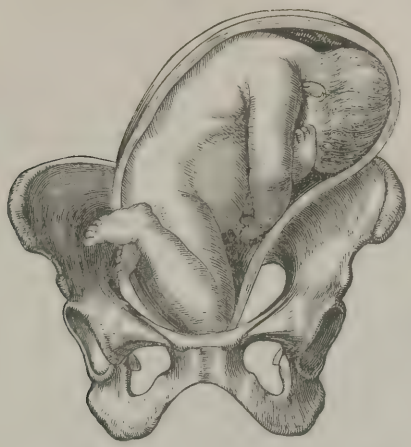
In some cases, however, the head is not so easily extracted, and I perfectly agree with Dr. Collins that "should there be any considerable obstruction to the getting away of the head, we are by no means justified in using violence; the soft parts of the mother will be sure to suffer from such a mode of proceeding, and on the child's part, nothing is to be gained; as it is destroyed by pressure on the funis, continued during the time the ordinary efforts have been diligently but unsuccessfully employed for its delivery." If the pulsation in the cord have ceased, "the only safe plan under these circumstances, will be to lessen the head by means of an opening made behind one or both ears." If the pulsation be good, it will be worth while trying the forceps, provided they can be introduced without difficulty; but we must remember that we cannot in these cases gain much space by compression, because we grasp the base of the skull.

603. 2. Presentation of the inferior extremities. — Under this head I include presentations of one or both of the knees or feet, as the

former are always converted into footling cases as the labour advances. In point of frequency they stand next to breech presentations.

604. Mechanism.—Adopting Naegelè's arrangement, we shall make but two divisions of this mal-presentation. 1. When the toes are directed

Fig. 130.



backwards, and 2, when the toes are directed forwards. The former is the more frequent, and both correspond to the two classes of breech presentations.

As we should expect, the feet, meeting with no resistance to fix them, are liable to change their position during their descent until the hips enter

Fig. 131.

the brim, which they do precisely as was described in breech cases (§ 594). In fact, in its further progress, the case is identical with breech cases, and the description already given will serve as well for footling cases, on which account I need not repeat it.

The expulsion of the body of the child may be more rapid, owing to the absence of the additional bulk of the thigh when doubled up on the abdomen, but it is just so much the less safe for the child.

605. Statistics. 1. *Frequency.*

a. British Practice.

Author.	Total Number of Cases.	Pres. of Inferior Extr.
Dr. Bland	1,897	18
Dr. Jos. Clarke	10,387	184
Dr. Granville	640	3
Dr. Merriman	2,947	40
Ed. Lying-in Hosp.	2,452	8
Mr. Gregory	691	7
Dr. Maunsell	839	21
Dr. Thos. Beatty	1,182	15
Dr. Collins	16,414	187
Mr. Lever	4,666	29
Mr. French	89	1
Dr. Churchill	1,525	22
Drs. M'Clintock and Hardy	6,634	38

b. French Practice.

Author.	Total Number of Cases.	Pres. of Inferior Extr.
Mad. Boivin	20,517	242
Mad. Lachapelle	15,652	247
M. Ramboux	501	3

c. German Practice.

MM. Moschner and Kursak	12,329	82
M. Richter	2,571	30
Dr. A. E. v. Siebold	2,059	25
Dr. E. C. v. Siebold	947	11
Dr. Kilian	2,350	8
Dr. Carus	2,908	23
Dr. Klugè	1,074	17
Dr. Brunatti	295	3
Dr. Theys	21	2
Dr. Adelmann	53	2

Thus in British practice we have 54,363 cases, and 572 presentations of the inferior extremities, or about 1 in 95.

In French practice, 36,670 cases, and 492 presentations of the inferior extremities, or about 1 in $74\frac{1}{2}$.

In German practice, 24,607 cases, and 203 presentations of the inferior extremities, or about 1 in 131.

Altogether, 117,640 cases, and 1268 foot or knee presentations, or about 1 in $92\frac{2}{3}$.

The following table shows the mortality among the children:—

Authors.	Footling Cases.	Children lost.
Mr. Giffard	23	13
Dr. Smellie	9	3
Mr. Perfect	11	6
Dr. Jos. Clarke	184	62
Dr. Ramsbotham	2	1
Dr. Merriman	40	6
Edinburg Hospital	8	2
Mr. Gregory	7	3
Dr. Beatty	15	10
Dr. Collins	187	73
Mr. Lever	29	16
Dr. Churchill	22	10
Drs. M'Clintock and Hardy	25	5

This gives a very large mortality, 210 children being lost out of 562, or about 1 in $2\frac{1}{2}$.

606. Symptoms.—The first circumstance in the labour which excites our suspicion of its being unnatural, is very often the early rupture of the membranes, and the large quantity of liquor amnii which escapes, and on making an examination we discover the absence of the head blocking up the brim, although we may not be able to make out the presentation. As the labour advances, one or both of the feet descend through the os uteri, sometimes with the toes pointing downwards, but more frequently bent up towards the labia. An examination at this period will enable us to form a diagnosis. The labour proceeds gradually, and the hips descend into the pelvis; then the chest, shoulders and head, precisely as described in breech presentations, and with the same evolutions and adaptations.

Danger to the mother can only arise from a prolongation of the second stage, or injury to the passages, and there is little risk of either so long as violent efforts be not made to extricate the child, and if the pelvis be well formed.

The danger to the child is greater than in breech presentations, one in two and a half being lost, and from precisely the same cause which made the latter more dangerous than head presentation, viz., the inadequate dilatation of the passages. The child passes through, as a wedge, and each succeeding part being wider than the preceding, has to effect dilatation sufficient for itself, and that at a stage when time is of great value from the pressure to which the child is exposed. The breech, with the legs turned up, is certainly less bulky than the head, and therefore prepares badly for the quick transit of the latter; but if the size of the breech be diminished by the thighs being extended, it is clear that much greater resistance and delay of the head will result: and in this greater delay, and consequent prolongation of the pressure upon the funis is the explanation of the increased mortality.

607. Diagnosis.—Footling cases may be confounded with presentations of the head; and if one foot only be down, the heel may be mistaken for an elbow. However, a little care will enable us to distinguish them. For instance, the foot is longer and the sole flatter than the hand; the toes are shorter, and more of a length than the fingers, and the great toe does not separate from the others, as the thumb does from the fingers. The presence of the heel with the ankle-bone on each side, is quite different from the hand and wrist. Tracing from the heel along the sole of the foot to the toes will, of course, distinguish the heel from the elbow. "In an examination the knee may be distinguished from the elbow, for which it may in some degree be mistaken," Naegelè remarks; "in that it is thicker, that it has two prominences, and a depression between them; while, on the other hand, the elbow, which is thinner, presents to the feel between the two prominences a projection in which it seems to end."

608. *Treatment.*—In every particular, the treatment of breech presentations applies to footling cases, except that I think there is rather more temptation to pull down the child at an early period, because of the greater facility for so doing; but, from what I have said, it must be evident that it is more necessary that the labour should be let alone. There can be no occasion to interfere until the pressure upon the funis is felt, and then the

risk to the child must decide upon whether assistance is to be given or not The same method must be adopted for extricating the arms, and for facilitating the expulsion of the head; and in the more difficult cases we have the same remedies at command.

609. 3. Presentation of the superior extremities. — In almost all cases of this kind it is the shoulder which primarily presents, and afterwards the arm prolapses; occasionally, however, we find the hand at the beginning of the labour at the os uteri, and more rarely the elbow.

In all cases the back of the child either looks forward towards the abdomen of the mother (fig. 132), or backward towards her spine (fig. 133): the former being twice as frequent as the latter.

Fig. 132.

In the majority of cases, with such a position of the child, labour may be considered as impracticable, unless assisted by art; and yet, even with such an untoward position, the natural powers have occasionally succeeded in expelling the child. Dr. Denman, in 1772, first noticed the fact, though he appears to have mistaken the process: he supposed that, during an interval of uterine relaxation, the shoulder and arm receded, and the breech came down into the pelvis; hence the name he gave to it, "*spontaneous evolution of the fœtus.*" We are indebted to the accurate observation and ingenuity of my friend, Dr. Douglass, a distinguished practitioner of Dublin, for the true explanation of the process in an essay published in 1811, from which the following short description is extracted. Before its expulsion the situation of the fœtus "resembles the larger segment of a circle; the head rests on the pubis internally, the clavicle presses against the pubis externally, with the acromion stretching towards the mons veneris: the arm and shoulder are entirely protruded, with one side of the thorax not only appearing at the os externum, but partly without it: the lower part of the same side of the trunk presses on the perineum, with the breech either in the hollow of the sacrum, or at the brim of the pelvis, ready to descend into it; and by a few further uterine efforts, the remainder of the trunk, with the lower extremities, is expelled. And, to be more minutely explanatory of this ultimate stage of the process, I have to state that the

breech is not expelled exactly sideways, as the upper part of the trunk had previously been; for, during the progress of that pain by which the evolution is completed there is a twist made, about the centre of the curve, at the lumbar vertebræ, when both buttocks, instead of the side of one of them, are thrown against the perineum, distending it very much; and immediately after the breech, with the lower extremities, issues forth; the upper and back part of it appearing first, as if the back of the child had originally formed the convex, and its front the concave side of the curve."

Fig. 133.

Thus the head, and the shoulder depressed in the pelvis, are fixed, and the remainder of the body doubled up, is inch by inch forced into the pelvis, and through the external parts, until all below the arm is expelled, leaving the case to be terminated as a breech or foot presentation. At no part of the process is the arm at all retracted; but if moved at all, it is still further protruded: the name of "spontaneous expulsion," given by Dr. Douglass, is therefore more suitable than that of "spontaneous evolution." An essential condition of this extraordinary effort of nature, is the relative disproportion of the fœtus and pelvis; either the fœtus must be smaller or the pelvis larger than usual, to permit it.

The accuracy of Dr. Douglass's explanation has been proved by the observation of Dr. Gooch and others. I can also add my testimony, having some years ago had an opportunity of witnessing the process.

610. Statistics.—*Frequency.*

a. British Practice.		
Authors.	Total No. of Cases.	Pres. of Sup. Ex.
Dr. Bland . . .	1,897	8
Dr. Jos. Clarke .	10,387	48
Dr. Merriman . .	2,947	19
Dr. Granville . .	640	1
Ed. Lying-in Hosp.	2,452	4
Dr. Collins . . .	16,414	40
Mr. Gregory . .	694	4
Dr. Cusack . .	701	5
Dr. Maunsell . .	839	4
Dr. Beatty . . .	1,182	4
Mr. Lever . . .	4,666	12
Mr. Mantell . .	2,510	4
Dr. Reid . . .	3,250	18
Dr. Churchill . .	1,525	9
Drs. M'Clintock and Hardy	6,634	26
b. French Practice.		
Mad. Boivin . .	20,517	80
Mad. Lachapelle .	15,652	68
M. Ramboux . .	491	4

Thus in British practice it occurred 206 times in 56,738 cases, or about 1 in 275$\frac{1}{3}$; and in French practice, 152 times in 36,660 cases, or about 1 in 241. Altogether, 358 times in 93,398 cases, or about 1 in 260$\frac{3}{4}$.

Authors.	Presentation of Superior Extremities.	Mothers lost.	Children lost.	Delivered by Version.	Delivered by Crotchet.
Mr. Giffard . .	24	0	15	21	
Dr. Smellie . .	34	3	19	28	
Mr. Perfect . .	6	1	2	6	
Dr. Jos. Clarke . .	48	6	21		
Dr. Ramsbotham .	27	6	18	12	11
Dr. Merriman . .	19	. . .	2		
Edin. Hospital . .	4	. . .	2		
Dr. Collins . . .	40	4	20		
Mr. Gregory . .	4	. . .	3		
Dr. Cusack . . .	5	0	2	4	
Dr. Maunsell . .	4	. . .	4	2	
Dr. Beatty . . .	4	1	4	4	
Mr. Lever . . .	12	3	8		
Dr. Churchill . .	9	0	5	9	
Drs. M'Clintock and Hardy . .	26	2	. . .	19	4

The second of the preceding tables is intended to show the mortality to both mother and child, so far as it is mentioned by the author: where it has not been recorded, I have left the space blank; but if either died, I have so specified. I have thought it worth while, also, to add some columns showing the different modes of delivery practised.

From this record we find, that out of 240 cases of presentation of the superior extremities 125 children were lost, or rather more than one-half. Out of 235 cases 26 mothers were lost, or nearly 1 in 9.

611. Symptoms. — Labour with this mal-presentation is, as the statistics show, extremely dangerous to the mother and child, and especially

as the remedy involves a very serious operation. Dr. Rigby has given a graphic picture of a case of this kind when unassisted: "after the membranes have burst, and discharged more liquor amnii than in general when the head of the nates presents, the uterus contracts tighter around the child, and the shoulder is gradually pressed deeper into the pelvis, while the pains increase considerably in violence from the child being unable, from its faulty position, to yield to the expulsive efforts of nature. Drained of its liquor amnii, the uterus remains in its state of contraction even during the intervals of the pains; the consequence of this general and continued pressure is, that the child is destroyed from the circulation in the placenta being interrupted, the mother becomes exhausted, and inflammation or rupture of the uterus and vagina are the almost unavoidable results."

On the part of the mother, so long as the labour is virtually (§ 386) in the first stage, the symptoms are perfectly natural and favourable; but after the second stage (marked by voluntary effort and change of cry) has lasted for some time, then we have in detail the symptoms of powerless labour, exactly as I have described them (§ 413); but with a difference in the results, owing to the mechanical obstruction offered by the mal-position of the child; and I regard these cases as the most striking illustration of the fact I have repeatedly pressed upon the reader's attention, viz. that the development of unfavourable symptoms is owing to the stage at which the delay occurs, and not the kind of impediment; for here we find that the same symptoms arise from a purely mechanical impediment on the part of the child, the uterine system being in perfect integrity, as we found to result from inefficient pains, from tumours in the soft passages, or from deformity of the pelvis.

612. Diagnosis. — Our first suspicion will probably arise from finding, on examination, that we are not able to reach the presentation; this, of course, proves nothing; but it ought to induce a very careful investigation, and we may find the os uteri very little dilated, and suffering comparatively little pressure during each pain, or the hand may be felt protruding through the undilated os uteri. The high situation of the presentation (if it be the shoulder) renders it difficult to ascertain the part which is descending. We may derive confirmation of our suspicions from finding the bag of the membranes protruding, of a conical or elongated form, and evidently not covering the head.

When the shoulder has descended a little, we may be able to reach the axilla, and we shall find that it is rounder than the elbow, and has not the condyles of the humerus, so that this will decide the point for us.

The hand may be mistaken for the foot; but its shortness, the length of the fingers, and the devarication of the thumb, will enable us to distinguish it. The situation of the thumb and the aspect of the palm of the hand will mark whether it is the right hand or the left.

613. Causes. — This mal-presentation has been attributed to irregular early contractions of the uterus, to irregular distention, to obliquity, &c. &c. They may possibly have some such effect; but I think all the explanations as yet offered are insufficient. Dr. Rigby concludes, "we may, therefore, state that the causes of arm or shoulder presentations are of two kinds, viz. when the uterus has been distended by an unusual quantity of liquor amnii, or when, from a faulty condition of the early

pains of labour, its form has been altered, and with it the position of the child."

614. Treatment. — As (with very few exceptions) the labour is impracticable, we have nothing to expect from the natural efforts, except an increase of difficulty, it becomes our duty to interfere promptly in every case. Should the mal-presentation have been detected before the rupture of the membranes, and before the os uteri is fully dilated, we may wait for a time to allow of as complete dilatation as possible, nor is there any risk so long as the membranes are entire. But if they have given way we ought not, and if the os uteri be fully dilated (whether the membranes be entire or not), we must not wait a moment, but proceed to deliver by turning. When the liquor amnii has not escaped there is seldom any difficulty, but after that event we generally find the uterus more or less strongly contracted upon the child, and in proportion to this contraction is the difficulty. If the uterine action be very intense, the operation may be impossible without risk of rupturing the uterus ; and in such cases, instead of proceeding at once to turn, a dose of tartar emetic or opium, or a combination of both, may be given, so as to moderate or suspend uterine action, and admit of the introduction of the hand. If the pulse be quick and strong, venæsection may be beneficial. I have already given the details of this operation (§ 493).*

Should these measures fail, and version be impracticable, we must open the chest of the child, and eviscerate ; after which it may be extracted by the crotchet.

" Several writers," says Dr. Collins, " recommend in difficult cases of this nature, the separation of the child's head, so as to bring the body away by the presenting arm, and afterwards deliver the head by the crotchet: this we would condemn, unless we failed in our efforts, by breaking down the thorax, which is very unlikely, if the operation be properly performed, and the pelvis not extremely under size. We once saw a delivery effected as above described, and the greatest difficulty was experienced in the extraction of the head ; it was necessary to introduce the hand to bring it into the vagina, and then it had to be lessened before it could be removed."

615. But it will at once be asked, what practical application can be made of our knowledge of the occurrence of spontaneous expulsion. I am afraid not much. I am satisfied that we ought not to wait for it in any case in which turning can easily be accomplished, because if it do not occur (and according to Dr. Douglass it does not occur above once in 10,000 labours), the operation will be rendered tenfold more difficult from the greater depression of the child, and more energetic action of

* Dr. Churchill is not sufficiently decided in his recommendation of bleeding in these cases. When the waters are evacuated, and the uterine contractions so strong as to render turning difficult and dangerous, there is no remedy equal to bleeding — largely, even *ad deliquium* — giving, at the same time, a full dose of laudanum, to prevent any undue reaction. If the practitioner is prompt and skilful, he may effect the turning before the relaxation consequent upon the bleeding shall have passed off. It is unnecessary in these cases to lose time by searching for both feet, as delivery can be accomplished equally well by bringing down only one, while the risk to the child is less. If, however, the child be dead, or there is much hemorrhage, it will be proper to seize and bring down both feet, with the view of accomplishing the delivery more rapidly, provided both can be gained without much delay or difficulty. — Editor.

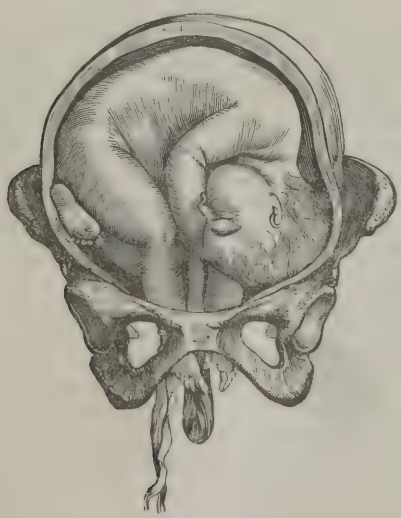
the uterus; it would, in fact, be exchanging a comparatively easy and not very dangerous operation for a very difficult one, in which the risk to the mother would be great, and the death of the child certain, provided this rare phenomenon did not occur. I think, however, that in such a case as Dr. Douglass has described, we may venture upon a little delay to afford a chance of spontaneous expulsion. "If the arm of the fœtus," says Dr. Douglass, "should be almost entirely protruded, with the shoulder pressing on the perineum; if a considerable portion of its thorax be in the hollow of the sacrum, with the axilla low in the pelvis: if, with this disposition, the uterine efforts be still powerful, and if the thorax be forced sensibly lower during the pressure of each successive pain, the evolution may with great confidence be expected."

As the minute details of management are the same in natural and unnatural labours, I have not thought it necessary to repeat them, but refer the reader to the chapter on that subject (§ 357).

616. 4. Compound Presentations. — From an untoward position of the body or extremities of the child, one or more parts may come together to the os uteri; in some cases merely adding to the bulk to be transmitted through the passages without altogether preventing it, in others rendering interference necessary for the delivery. For instance:

1. *The hand or arm may present with the head*, of course adding to its size, and perhaps, if the pelvis be small, prohibiting its entrance into the passage. Nor is this without danger if the uterine action be violent. However, as Dr. Merriman has observed, it rarely occurs except when the pelvis is large. For which reason, if it be discovered early, a cautious attempt should be made to replace the arm above the head so as to allow it to descend alone, but, above all things, we must be cautious neither to draw down the hand nor to displace the head, as either may convert a simple manageable case into an arm presentation.

Fig. 134.



If the arm cannot be replaced, the case must then be treated as one of relative disproportion; perhaps a little time and extra uterine action (which is generally exerted, as we have said, in proportion to the demand for it) may suffice: if not, and the delay should excite unfavourable symptoms, we must first see if the forceps are applicable, or version, and, as a last resource, if all others fail, we must lessen the head. I prefer the forceps to version, because of its inferior mortality as regards both mother and child; and version (when possible) to the crotchet, for the same reason.

2. The *feet and hands may present*, or one of each, and in these cases it not unfrequently happens that the cord prolapses (fig. 134).

In such cases, it is evident that one or other extremity must descend and give the character to the labour, making it an arm or footling case.

Now it is exactly for the determination of this question that we ought to interfere. There can be no doubt of the propriety of drawing down the foot or feet into the pelvis so as to preclude the possibility of the arm descending, and when this is done, the case is one of footling presentation, and to be managed accordingly.

But I must repeat my caution that the greatest care is necessary, first, not to mistake a hand for a foot, and secondly, not to favour the descent of the hand and arm by the mode of examining.

Prolapse of the cord increases the danger to the child, and may (according to the rules laid down) require us to hasten the labour if the pulsations be weak and the woman have previously had children.

CHAPTER XVII.

PARTURITION.—CLASS II. UNNATURAL LABOUR.
ORDER 6. PLURAL BIRTHS.—MONSTERS.

617. 1. Plural Births.—I have already stated (§ 228) the signs by which twin pregnancy is to be recognised, and also that in the majority of cases they are very dubious. Each child possesses its special envelopes and a separate placenta, though they are sometimes so pressed together as to appear but one, and occasionally a vascular communication passes from the one to the other. The labour is often premature, and the children are generally smaller than usual.

The mode of transmission of each child may be perfectly natural, or either or both may come under some of the orders of unnatural labour already described, requiring the management suitable for such cases: so far, a separate notice of plural births is unnecessary: but on the other hand, there are some important points of practice, and some details as to the presentation and mortality in such cases, which require to be investigated. In this chapter, therefore, I shall chiefly remark upon the circumstances peculiar to plural births, and, to avoid repetitions, refer to the previous sections for the ordinary treatment.

A woman may conceive of two, three, four, or five children, but I am not aware of more than four children having been born alive at one birth.

The statistics I have been able to collect are not very extensive, but there are some interesting points which I have endeavoured to investigate as fully as the means permit.

618. STATISTICS.—1. *Frequency.*

Authors.	Total No. of Cases.	Twins.	Triplets.	Quadruplets.
a. British Practice.				
Dr. Jos. Clarke	10,307	184	3	1
Dr. Merriman	2,947	39	1	
Dr. Granville	640	9		
Edinburgh Hospital	2,452	31	2	
Dublin Hospital	129,172	2,062	29	1
Dr. Maunsell	839	13		
Mr. Gregory	691	12		
Dr. Beatty	1,182	18		
Mr. Lever	4,666	33		
Dr. Reid	580	9		
Mr. Warrington	110	3		
Dr. Churchill	1,640	25	1	
Drs. M'Clintock and Hardy	6,634	95	1	
b. French Practice.				
Mad. Boivin	20,357	154	3	
Mad. Lachapelle	15,481	165	3	
Hôtel Dieu, Paris	280	4		
M. Mazzoni	452	9		
c. German Practice.				
Dr. Henne	1,214	1		
Dr. Richter	2,571	52		
Moschner and Kursak	12,329	165		
A. E. v. Siebold	1,409	20		
Dr. Riecke	219,303	2,545	34	2
Dr. Klugè	809	15		
Prof. Andrée	176	5		
Dr. Theys	55	4		
Dr. Brunatti	99	2		
Dr. Adelmann	56	1		
Dr. Jansen	13,365	157	1	

So far as these numbers go, we find among British practitioners, in 167,676 cases, 2,572 cases of twins, or about 1 in $65\frac{1}{5}$, and 37 cases of triplets, or 1 in $4{,}531\frac{1}{3}$. Among French practitioners, in 36,570 cases, 332 cases of twins, or about 1 in 110; and 6 of triplets, or 1 in 6,095. Among German practitioners, in 251,386 cases, 2,967 cases of twins, or about 1 in 84; and 35 of triplets, or about 1 in 7,185. Taking the whole, we have 455,632 cases, and 5,871 of twins, or 1 in $77\frac{3}{4}$; and 78 cases of triplets, or 1 in 5,840.

I have formerly quoted the comparative frequency in different countries stated by M. Quetelet.

2. *Mortality.*

Authors.	Twin Cases.	Children lost.	Triplet Cases.	Children lost.
Mr. Giffard	14	9	1	
Dr. Smellie	8	2	2	
Mr. Perfect	7	7		
Dr. Jos. Clarke	184	282	3	
Dr. Ramsbotham	15	9	2	4
Dr. Granville	9	4		
Dr. Collins	240	58	4	4
Mr. Gregory	12	16		
Dr. Beatty	18	8		
Mr. Lever	33	6		
Dr. Jansen	157	16		
Drs. M'Clintock and Hardy	95	19		

Thus out of 792 cases of twins (*i. e.* 1,584 children) 436 were lost, or about 1 in $3\frac{1}{2}$; and out of 12 cases of triplets (*i. e.* 36 children) 11 were lost, or 1 in 3.

This mortality, however, which is very large, must be qualified by allowing for the great number of children whose death could not be attributed to the labour. Dr. Jos. Clarke had 43 still-born; Dr. Collins had 54 premature labours among the twin cases, and 12 cases of the birth of a putrid fœtus.

The mortality to the mother in twin cases has been computed as 1 in 20: in Dr. Collins' cases it was 1 in 34. I regret that, from the imperfection of the records, I cannot give ample statistics on this point.

As to the sexes in twin cases, the following cases are recorded:—

Authors.	No. of Twin Cases.	Both Males.	Both Females.	One Male and one Female.
Dr. Jos. Clarke	184	47	68	71
Dr. Collins	240	73	67	97
Mr. Lever	33	11	11	11
	457	131	146	179

Thus we find that twin children are most frequently of opposite sexes, and that twin females are more common than twin males. From Dr. Collins' most excellent record I may state, that of his twin male cases 23 were dead (one putrid), and that of these 23, 13 were the first-born children; of the female twins, 11 were dead (4 putrid); and of the twins of opposite sexes, 22 were lost (7 putrid), of which 15 were boys and 7 girls. This is important, since from it we learn that there is more danger to the boys than the girls, and particularly when they are twin cases of opposite sexes.

From the reports of the same authors, the presentations, placed in order of birth, were as follows:—

Authors.	Both Head.	Head and Breech.	Head and Foot.	Both Breech.	Breech and Head.	Breech and Foot.	Both Footling.
Dr. J. Clarke . . .	16	. .	25	2	6	1	3
Dr. Collins	103	30	25	8	25	9	5
Mr. Lever	15	7	5	2	. .	1	

Authors.	Foot and Head.	Breech and Elbow.	Head & Arm or Sho'ld'r.	Face and Head.	Head and Face.	Foot and Hand.	Foot and Breech.
Dr. J. Clarke . . .	10						
Dr. Collins	19	1	5	1	1	1	1
Mr. Lever	. .	. .	2				

Dr. Collins thus states the mortality of his different presentations: when both were head presentations, he lost 24 (4 putrid), when the head and breech (*i. e.* the first child with the head, and the second with the breech) presented, 2 of the former and 5 of the latter were lost; when the head and feet, 2 of the former and 3 of the latter; when the feet and head, 4 of the former and 2 of the latter; when the breech and the head, 1 of the former and 6 of the latter; when both were footling cases, 2 were lost; when the breech and feet, 3 of the former and 2 of the latter were lost.

This confirms what I have elsewhere stated, that the less the passages are dilated by the presenting part, the greater the mortality amongst the children, because of the delay in the transit of the remaining parts of the body of the child.

619. Symptoms.—The first, second, or third child may present naturally or unnaturally, and in that respect the course of the labour will resemble that of similar cases with single children. But it is generally remarkable that the progress of the first child is slower than we should have expected; for, on examination, there appears no want of space, and the pains may be strong. This I suppose arises from the pressure of the entire uterus not bearing directly upon the child which is to pass first, but at least as much and primarily upon the second child. The pressure upon the second child causes it to press down the first child; but in this transmission of force much power is necessarily lost, and thus it is that we find very gradual progress in these cases, notwithstanding that the pains are good and the space ample. When the first child is born, whatever suspicions may have been previously entertained are changed into certainty, unless in the case of a small blighted fœtus; for, upon placing the hand upon the abdomen, the uterus is felt nearly as large as at first, and the child may be detected through its parietes.

After the birth of the first child, there is an interval of rest, varying from ten minutes to some hours; nay, instances are on record of days and weeks intervening before the birth of the second child. Of 212 cases related by Dr. Collins, in which the interval is accurately marked, in 38 it was 5 minutes; in 29, 10 minutes; in 45, 15 minutes; in 23,

20 minutes; in 30, half an hour; in 5, three quarters of an hour; in 16, 1 hour; in 8, 2 hours; in 3, 3 hours; in 5, 4 hours; in 1, 4½ hours; in 3, 5 hours; in 2, 6 hours; in 1, 7 hours; in 1, 8 hours; in 1, 10 hours; and in 1, 20 hours. Thus in by far the larger number the uterine action was resumed within half an hour. Dr. Merriman refers to three remarkable cases; in one the second child was retained fourteen days after the first; in the second, it was retained six weeks; in the third case, the woman was delivered of twins, and two days afterwards of two more boys.

After this interval, whatever it may be, the pains return; and if there be nothing unusual on the part of the child, the labour is completed in less time than with the first child, because of the previous dilatation of the passages. For the same reason, when the second child presents with the breech or foot, the mortality is less than usual. Dr. Denman remarks, "the most fortunate presentation of the second child in a twin case is certainly with the inferior extremities, because it may in this position be extracted without injury or difficulty, and if assistance be required, this may be given with safety and convenience."

620. Treatment.—Whether the first child present with the head or any other part, it is to be treated exactly according to the rules heretofore laid down, just as if it were a single birth; and so, as far as the labour is concerned, must the second child; thus if the first be a natural labour and the second a mal-presentation, we need not interfere with the first, but assistance may be necessary with the last child; or the first may be a mal-presentation requiring assistance, and the second a natural labour needing none. So far we must act according to the nature of the case. But suppose that the uterus do not resume its action after the ordinary interval, are we still to leave all to nature? It is clear that, if the passages be allowed to recover from the former distension, there will be more trouble with the second child, especially if it be a mal-presentation; and that there must be a risk of hemorrhage so long as the uterus remains uncontracted; and it would seem that delay involves danger to the second child. For these among other reasons, opinions have varied as to the necessity of interference, and as usual the practice has ranged from one extreme to the other; some having advised instant delivery to obviate these dangers, and others, finding that in many cases left to nature no evil has followed, recommending that we should abstain from all interference.

Dr. Denman advises us to wait for four hours, "if there be no cause for delivery sooner." Dr. Ramsbotham two or three hours. Dr. Burns about an hour. Dr. F. Ramsbotham agrees with Denman.

Dr. Campbell suggests that ergot should be given before we attempt to extract the child. The rules laid down by Dr. Collins appear to me extremely judicious; he advises a middle course: "As soon as the first child is born, a binder should be applied so as to make gentle pressure upon the abdomen; we should not leave the house until the second child is delivered. If we find after the lapse of half an hour that the membranes of the second child still remain unbroken, they may be punctured with advantage, with the view of exciting uterine action, as the soft parts having been so well dilated by the passage of the first, no bad result can ensue. This expedient in some instances will be found not to succeed; and in such cases, when we do not observe any progress made in the

course of two hours after rupturing the membranes, the best mode of proceeding will be to pass the hand cautiously into the uterus, and bring down the feet. There will be but little difficulty experienced in this operation, the parts being in so relaxed a state. When the head has made any considerable descent into the pelvis, the forceps will be the best means of affording assistance. It is very rarely, however, that we are called upon to effect delivery by either of the latter methods: yet experience has shown that the second child is very likely to be still-born if left longer than two or three hours unassisted."

There are circumstances, as Dr. Merriman has justly observed, which would negative any delay in the delivery of the second child; as, for example, 1, when artificial aid has been required with the first child; 2, when the second child presents preternaturally; and 3, when the labour is complicated with convulsions, hemorrhage, &c.

Any deviation from normal labour with the second child is to be treated according to the rules laid down, without regard to its being a twin case.

621. With regard to the placenta of the first child; unless it come away quite easily, I believe that in all cases it is better to leave it until after the birth of the second child, as its removal might excite uncontrollable flooding. After the birth of the second (or third) child, the binder is to be tightened, and some degree of pressure or friction made upon the uterus, and when we find it disposed to contract, then we may draw down (in the axis of the upper outlet) first one cord, and if that do not yield, the other, or both together, so as to aid in the expulsion. But it must be remembered that after the delivery of plural children the uterus is less disposed to renew its exertions, and therefore a longer interval must be allowed: and that by the detachment of the placenta a much larger surface of bleeding vessels will be exposed, and, therefore, that we should avoid their forcible separation by traction, and should be particularly careful to secure the due and permanent contraction of the uterus afterwards.

"In twin cases," Dr. Collins observes, "when it becomes necessary to remove the placenta, we should be careful not to withdraw our hand from the uterus, until both be separated, at the same time waiting for uterine action, so as to induce as perfect a contraction of this organ as practicable: *a point of most vital importance.*"

The shock to the nervous system is generally greater than after natural labour, and in some cases it is very severe: this may justify the exhibition of stimulants and opium, and it demands extreme quiet and care.

The management of twin cases applies equally to triplet and quadruplet cases; especially the care recommended as to the placentæ.

Dr. Denman states that "it is a constant rule to keep patients, who have borne one child, ignorant of there being another, as long as it can possibly be done." There is certainly no occasion to frighten the patient by an abrupt communication; but, on the other hand, I do believe that concealments are bad, and that in midwifery as everywhere else, "honesty is the best policy;" besides, the patient is almost certain to suspect the state of the case, and to inquire concerning it. I think with Dr. F. Ramsbotham, that in all cases "it is better neither to inform her abruptly of the nature of the case, nor to make any mystery about it; but certainly to tell her,

that she will soon give birth to a second; and this may be coupled with a congratulation on the fortunate progress of the labour so far; and an assurance that she will have but little more pain to bear, and that the case presents no feature calling for anxiety."

622. I have hitherto spoken only of twin cases in which one of the children only presented; but it has occasionally happened, that both bags of membranes have ruptured, and an extremity of different children descended at the same time. Thus, the late Dr. Fergusson of this city, has published a case in which the head of one child and the foot of another presented together. The midwife drew down the leg, and so jammed the head and breech in the pelvis together. However, the pains being powerful, expelled the natural presentation first and the other afterwards. A similar case is recorded in the Edin. Med. and Surg. Journal, 1822, by Mr. Alexander, and Mr. Allen relates one in the Med. Chir. Trans. vol. xii., in which the two heads occupied the pelvis together, and both were naturally expelled. Dr. F. Ramsbotham mentions having been called to a case when a right and a left foot belonging to different children presented; he pushed up one and extracted by the other, and both children were born living.

Such cases are no doubt very puzzling at first, and may excite some anxiety as to the result; but it may be remarked, that the descent of a foot with the head proves that the pelvis is unusually large, and in all the cases it appears that the pains were very powerful. It would, therefore, be right, if we could not push up one of the presenting parts, to give fair play to the natural powers, and only upon conviction of their inefficiency to lessen the bulk of one child. If the head of the footling case were within reach, it would be better to operate upon it, as the child's life will have already been compromised by the pressure upon the cord, whilst the other child has incurred little or no danger.

In such a case as Dr. F. Ramsbotham's, we must of course adopt a similar line of practice, pushing up one leg and drawing down the other, until the breech be engaged in the upper outlet.

623. II. Monsters.—All that is obstetrically important relating to this subject may be comprised in a few words. As far as we are concerned, we may divide all these deviations from normal formation into monstrosities by defect and excess, those from disease, and the cases where two children are conjoined. The only practical point involved, is their relation in size to the pelvis; consequently with those by defect we have nothing to do, as there is no difficulty in their transit through the pelvis. Monsters from excessive development of different parts likewise come under the class of which we are treating, just so far as their bulk is rendered disproportionate to the pelvis.

624. The principal diseases which render the child disproportionate to the passages, are *hydrocephalus* and *ascites*. Neither are very uncommon, and most practitioners must have met with cases of them. When a child, affected with hydrocephalus, presents at the brim, the entrance may be effected with difficulty, or it may be quite impossible: the head is nearly incompressible. On examination, therefore, we find that, notwithstanding good pains, in well-marked cases, the head does not dip into the pelvis; that no advance whatever is made by the uterine pressure (fig. 135). The head feels full and tense. If the labour were left to nature we should,

after due time, have all the bad symptoms of a prolonged second stage. The diagnosis is obscure: if we ascertain the pelvis to be of the usual size, and still find that the great bulk of the head is above the brim and cannot descend, the case is clearly one of great disproportion, and it is

Fig. 135.

equally plain that the excess is on the part of the child; in such circumstances it will be fair to suppose the case one of hydrocephalus, especially if we find the pulsations of the fœtal heart have ceased.

I need not say that the diagnosis will be much more difficult if the feet present, although the same principles of treatment apply equally, first having established the impracticability of delivery, from relative disproportion.

625. In *ascites*, there is much less obscurity; the head having been expelled, it is easy to see that the difficulty arises from the distension of the abdomen of the child, and a careful examination will, in most cases, distinguish between ascites and tympanites. In the latter case, the air is seldom limited to the abdomen, but the face and chest will be found more or less puffed.

626. Double monsters are very rare, and may create great difficulty in the delivery, although there are cases on record of the children having been born alive. Dr. Burns quotes several such: "In the seventh volume of the Nouv. Journ. p. 164," he says, "is a case where two children were born at the full time, united by the inferior part of the belly, from the centre of which came the cord. The vertebral columns almost touched at the lower part. The two children, who were of different sexes, lived, we are told, twelve days, but nothing is said of the labour. In the Bulletins for 1818, p. 2, two children, who were joined by the back at the sacrum, are stated to have been born, and lived till the ninth day. The first child presented the head, but the midwife could not well tell how the second got out. There is another case, at page 32, of a woman who, after many days of labour, bore a monster double in its upper parts. The spinal column was united from the sacrum to the top of the dorsal verte-

bræ, then the cervical vertebræ divided to form two necks. The midwife finding the head to present along with the cord and a hand, tried to turn, but could discover nothing but superior extremities. She, therefore, let her alone. The head was afterwards expelled, but neither nature nor art could deliver the body. M. Ratel finding the head and two arms already almost separated from the body, cut these parts off, then introducing his hand, he found another head, turned the child, and brought away the whole mass."

There is a skeleton in the Royal College of Surgeons of Ireland of a double monster, the children being joined by the lower part of the sacrum, and I believe they were also born alive. The Siamese twins is another instance of the kind.

627. Treatment. — I have already stated the general principle by which we are to be governed in all these cases. Whenever the monstrosity adds so much to the bulk of the child as to render the delivery impracticable by the natural powers, we must lessen the bulk.

In cases of hydrocephalus there need be no hesitation; in most cases the child is dead, and, as in well-marked examples there is no chance of such an adaptation as will enable the head to pass, the sooner it is perforated the better. The ground of the operation is the mechanical impediment to delivery, and the death of the child will justify an early interference. The operation is very easy; but, should the operator not have suspected hydrocephalus, but disproportion from another cause, the sudden rush of water may alarm him lest he should have perforated the bladder. In footling cases the head must be perforated behind the ears.

When the body cannot be extracted, owing to the distension by air or water, relief may be afforded by plunging the perforator into the body.

As to the double monstrosity, Dr. Burns remarks very truly, "the general principle of conduct must be, that, when the impediment is very great, and does not yield to such force as can be safely exerted by pulling that part which is protruded, a separation must be made, generally of that part which is protruded, and the child afterwards turned, if necessary. Unless the pelvis be greatly deformed it will be practicable to deliver even a double child by means of perforation of the cavities, or such separation as may be expedient, and the use of the hand, forceps, or crotchet, according to circumstances. A great degree of deformity may render the Cæsarean operation necessary.

I may add, as a caution to my junior readers, that the destruction of a monster after birth (no matter how great the deformity) is punishable as infanticide.

CHAPTER XVIII.

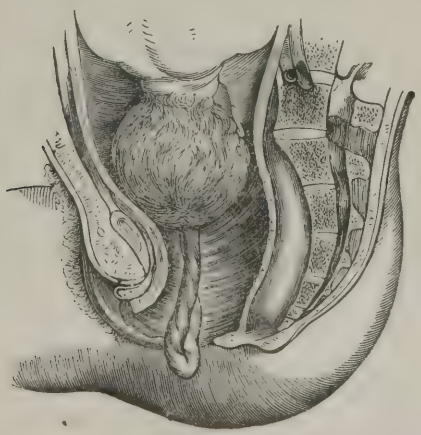
PARTURITION.—CLASS III. COMPLEX LABOUR.

ORDER 1. PROLAPSE OF THE FUNIS UMBILICALIS.

628. Having fully considered natural labour, where the agents or elements of parturition are equally balanced; and unnatural labour, where the abnormal deviation is dependent upon some deficiency or irregularity in the power, the passages, or the child, we shall now pass on to the third class, or complex labour, in which, as I observed before, the characteristic is not any thing in the mechanism of labour, but arises from some accidental complication. The labour itself may be natural or unnatural, but more frequently the former than the latter: however, with the consideration of the labour (except as connected with the complication) we have nothing to do.

The first complication I shall describe is prolapse of the funis, either alone, or along with the presenting part; and occurring either at the commencement or during the course of the labour.

Fig. 136.



This accident has no influence whatever upon the progress of the labour; but a very serious one upon the life of the child, and any interference which may be advised is for the purpose of rescuing it from peril.

629. Statistics. — We may form some idea of the frequency of its occurrence, and of the result to the child, from the following table: —

1. *Frequency.*

British Practice.			*French Practice.*		
Authors.	Total No. of Cases.	Prolapse of Twins.	Authors.	Total No. of Cases.	Prolapse of Twins.
Dr. Bland . . .	1,897	1	Mad. Boivin . .	20,517	38
Dr. Jos. Clarke .	10,387	66	Mad. Lachapelle	15,652	26
Dr. Merriman .	2,947	8	M. Mazzoni . .	452	18
Dr. Granville .	640	1			
Edin. Lying-in Hospital .	2,452	3			
Dr. Collins . .	16,414	97	*German Practice.*		
Dr. Cusack . .	398	5			
Dr. Maunsell .	839	2	M. Richter . .	624	4
Mr. Gregory . .	691	7	A. E. v. Siebold	492	2
Dr. Beatty . .	1,182	6	Dr. Voigtel . .	29	1
Mr. Lever . .	4,666	6	Dr. Jansen . .	13,369	86
Dr. Reid . . .	3,250	16			
Mr. French . .	89	1			
Dr. Churchill .	1,525	7			
Drs. M'Clintock and Hardy	6,634	37			

Thus, in British practice it occurred 263 times in 54,011 cases, or about 1 in 207½; in French practice, 82 times in 36,621 cases, or about 1 in 446½; and, in German practice, 93 times in 14,514 cases, or about 1 in 156. Taking the whole together, we have 105,146 cases, and 437 examples of prolapsed funis, or about 1 in 240.

The risk to the child may be estimated from the following table:—

2. *Mortality.*

Authors.	Cases of Prolapse.	Children lost.	Cord replaced.	Delivered Naturally.	Delivered by Version.	Delivered by Forceps.
Mr. Giffard . . .	21	17	2	. .	15	5
Dr. Smellie . . .	6	2	. .	. .	5	
Mr. Perfect . . .	4	3	. .	. .	4	
Dr. Jos. Clarke . . .	66	49				
Dr. Merriman . . .	8	4				
Dr. Ramsbotham . .	1	1	. .	. .	1	
Dr. Collins	97	70				
Dr. Cusack . . .	5	5				
Mr. Gregory . . .	7	4				
Dr. Beatty	6	4				
Mr. Lever	6	2				
Dr. Churchill . . .	7	5				
Drs. M'Clintock and Hardy	37	25	5	6		
Mad. Boivin . . .	38	9	. .	. .	25	13
Mad. Lachapelle . .	26	7	2	1	10	13
Dr. Voigtel . . .	1	. .	. .	. .	1	
Dr. Jansen	86	38	. .	. .	46	6

Here we find that out of 392 cases of prolapse, 245 children were lost, or more than one-half; a larger mortality than we find in any other order of practicable labour.

It must always be remembered, when speaking of the results of this accident to the child, that in lying-in hospitals many of the cases do not seek admission till some time after the occurrence, when the chance of a safe delivery is diminished; and some not until the cord has ceased to pulsate. Twenty-two such cases occurred out of the 73 unfavourable ones Dr. Collins has recorded.

630. Causes. — Many circumstances have been assigned as likely to *cause*, or to *favour* the occurrence of this complication.

1. *Mal-position of the child.*—Smellie, in his plate of this accident, has represented the child lying across the uterus, with the umbilicus at the upper outlet, and the cord hanging down in the cavity of the pelvis; and Froriep regards this as an exact explanation. After a careful examination of the cases I have seen, and a tolerably extensive investigation into those recorded by authors, I can find few, if any, facts in support of this view, and must, therefore, attribute the explanation rather to Smellie's ingenuity than to his observation.

2. It would appear that a *small* child, with a *large quantity* of the *liquor amnii*, by allowing the head of the fœtus to move away from the brim of the pelvis during the latter months, will favour the escape of a loop of the funis.

3. The *sudden rupture* of the membranes, and the *forcible rush* of a large quantity of the *liquor amnii*, may have a similar effect, and especially when aided by an untoward position in the mother, as occurred to a patient of mine who was standing up when the membranes suddenly ruptured.

4. It will be favoured by a *presentation of the feet or knees*, as they do not fill up the upper outlet; and even where the cord does not descend at the commencement of labour, it may before the breech enters the pelvis. M. Naegelè is not correct, however, in stating that it occurs most frequently with footling cases.

5. M. Naegelè adds, *irregular shape*, or *irregular action of the uterus* as an occasional cause.

6. *Excessive length* of cord forms undoubtedly an important element; but it requires other conditions also, since in the cases of cords of from thirty-six to fifty-four inches long which I have noticed, no prolapse occurred.

7. I may state, from my own observation, that I have found, in several cases of prolapse, that the *placenta* was situated *low down* near the cervix uteri, and, in some few others, that the *funis was inserted into the lower edge* of the placenta.

There are cases, however, which are not attributable to any of these causes.

I have already mentioned a case in which prolapse was prevented by the coiling of the cord round the neck of the child.

631. In all cases of prolapsed funis, the child is in the utmost danger from the moment the upper strait of the pelvis is filled by the part of the child descending, in consequence of the pressure upon the cord, just as in footling cases. The effects of this pressure are in proportion to the time it is continued, if the cord be not partially shielded from it by its situation.

There are but few cases in which the child escapes safely when the

labour is left to the natural powers. In those in which I have seen this happy result, the pelvis was very large, the child of a moderate size, and the pains very violent, so that the second stage of labour occupied but a very short space of time. The same result will obtain in those cases where the cord is shielded from pressure, by being lodged in the angle at the junction of the sacrum and ilium. The chances will be still greater, if the patient have previously borne five or six children.

632. Treatment. — The means to be adopted will depend entirely upon the state of the prolapsed cord. Should it exhibit marks of putrefaction, or be without pulsation, it will be useless to interfere, because hopeless as regards the life of the infant, and the labour may be allowed to terminate naturally. Capuron advises us not to interfere at once, even though the cord should pulsate, but rather to wait until the pulsations become feeble. It will certainly be desirable that the os uteri should be as much dilated as possible; and if we discover the prolapsed cord before the rupture of the membranes, it will be well to postpone their rupture until that object be effected.

Various modes of management have been proposed.

1. We are advised to push the cord upwards, beyond the brim of the pelvis, and there to retain it with one or two fingers, until the upper outlet be filled by the descending head.

This would seem easy and certain, but in practice it is not so; for the pains which force down the head, force down the cord also, and besides, there is some risk of displacing the head. This re-position is still more difficult, if any other part than the head present. On the whole, I believe I may say that it rarely succeeds.

2. It has been proposed to return the cord, and to hook it over the limbs of the child. This may also succeed, but it is a very difficult and a somewhat dangerous operation, and I am inclined to agree with Dr. Burns, that "if the hand is to be introduced so far, it is better at once to turn the child."* It is but right to add, that Sir R. Croft succeeded twice in this way.†

3. Various mechanical expedients have been contrived for retaining the cord when replaced. Thus enclosing the cord in a leather bag, and pushing it beyond the head of the child, was recommended by Mackenzie;‡ attaching the cord to the extremity of a canula, by Ducamp; or of a catheter, by Dudan;§ the reductor, by Aitken; a thin elastic flat rod of steel, by Dr. D. Davis;‖ and a modification of some of these contrivances was suggested by Champion, Favereau, and Guillon.¶

Dr. Harris, of Philadelphia, returned the cord above the knees in a breech presentation, and the child was saved.

4. Osiander, Busch, Hogben, and Hopkins, propose to retain the cord by introducing a piece of sponge after its replacement.

5. Dr. S. Merriman has twice succeeded in saving the infant, not by returning the cord, but by placing it in the angle formed by the junction

* Principles of Midwifery, p. 433.

† Merriman's Synopsis, p. 99.

‡ Merriman, p. 99.

§ Revue Med. 1828, vol. iii. p. 502.

‖ Elements of Operative Midwifery, 1825, p. 170.

¶ Velpeau, Traité des Accouchemens, p. 342. Ed. Brux.

of the sacrum and ilium, where it is in a great measure shielded from pressure.

6. If we determine to try the preceding plans, or if the advance of the head preclude any attempt at re-position, or, lastly, if the cord come down during labour, we may increase the chances of safety by applying the forceps and hastening delivery, as soon as the head is within reach.

7. If the patient have had children before, and if the pelvis be roomy, and the soft parts well dilated, perhaps the best chance for the child is in turning, particularly if there should be a mal-presentation.

But as this operation is not without hazard to the mother, we should accurately estimate the favourable or unfavourable probabilities as regards the child, before we attempt it.

Madame Boivin turned the child in 25 cases, and used the forceps in 13 out of the 38 cases she has recorded, and saved 29 children. Madame Lachapelle in 23 cases used the forceps 13 times, and version 10; 17 children were saved.

In one case, Dr. Collins saved the child by returning the cord, and retaining it by the hand in the vagina; in another, by enclosing it in a linen bag, returning it, and retaining it there by introducing a piece of sponge.*

Should the delivery have been completed within a short time after the cord has ceased to pulsate, it will be our duty to employ for some time the usual means for resuscitating the child: so long as the heart beats ever so faintly, there is hope.

* "Many various methods of repositing the cord, or putting it back into the womb, above the fœtal head," remarks Dr. Meigs (*Obstetrics; the Science and the Art*, 2d ed.), "have been proposed; they have mostly been found ineffectual, the cord being apt to fall down again, even after it had been put into the proper place. I have never yet had an opportunity to try a method which I beg leave to propose to my readers, and which is as follows: Take a piece of riband or tape, a quarter of an inch wide and four or five inches long. Half an inch from the end, fold the tape back, and sew the edges so as to make a small pocket. Then fold the other end in the opposite direction, and sew that also, to make a pocket of it. Now if the cord be taken in the tape, and held as in a sling, a catheter may be pushed into one of the pockets, and that one thrust into the other, so that we shall have the cord held as in a sling, which is itself supported on the end of the catheter or womb-sound. Let the catheter be now pushed up into the womb, beyond the fœtal head; it will carry the secured portion of cord with it, and the catheter being withdrawn, the tape is left in the uterine cavity, where no harm can be occasioned by its presence. If required, several such tapes could be secured round the cord, and all of them fixed on the end of the same catheter, and pushed at the same moment far up within the cavity of the womb." — Editor

CHAPTER XIX.

PARTURITION.—CLASS III. COMPLEX LABOUR.

ORDER 2. RETENTION OF THE PLACENTA.

633. In the definition of natural labour I included the expulsion of the placenta "in due time;" and when speaking of the third stage (§ 339) I mentioned that Dr. Clarke found the average interval between the birth of the child and expulsion of the after-birth was 20 minutes, and that out of 277 cases observed by myself, in 250 it was expelled within a quarter of an hour; from these data I remarked "we may conclude with the highest authorities, that in natural labour the placenta ought to be expelled within an hour or an hour and a half, and that when the interval exceeds this, the case fairly comes under the order of "retained placenta."

There is, however, an exception to the stringent application of this rule, and that is when, from the length of the labour or its abnormal character, the uterus has been over-fatigued, so that it does not so soon resume its contractions. There is no reason to suppose the uterus exempted from fatigue in proportion to its exertions, any more than any muscle of the body; and when it has been so fatigued, we do find that it requires and takes a longer interval of rest than usual, and that after this has elapsed, it contracts again, and expels the remaining contents. In estimating the interval which ought to elapse before we interfere, we must, therefore, take into consideration the peculiar kind of labour and probable amount of fatigue, and allow a certain variation accordingly.

Some writers have recommended that the placenta should never be extracted except in case of hemorrhage; but it was found that if left to nature, it was occasionally retained until it putrefied and excited uterine inflammation; for this reason, others recommended its immediate extraction; but the truth appears to lie between the two extremes. We do not interfere when the uterus is adequate to the expulsion, but when we are convinced that its efforts are suspended or inadequate, we extract it, to avoid the risk of hemorrhage or inflammation of the uterus.*

* No patient can be safely left until the placenta is delivered and the uterus has so far contracted as to secure her from the danger of hemorrhage. Dr. Robert Lee is of opinion that, "in all cases, whatever the cause of the retention may be, if the placenta, at the end of an hour, is not detached from the uterus and expelled, it should be withdrawn artificially by passing the hand along the cord to its insertion, expanding the fingers, and grasping the whole mass, or as much as can be seized and brought away. The difficulty of removing portions of placenta, adhering with more than the natural firmness to the uterus, is only increased by delay."—*Clinical Midwifery*, p. 191. But, with Dr. Meigs (*op. cit.*), we believe "there can be, nor ought to be, no fixed rule on the subject, except this one rule, namely, the placenta must be got away, as there is no security while it is left." Dr. Meigs thinks that he has never waited for its spontaneous extrusion more than an hour and a half, for he has always supposed that if it would not take place in one hour, there was little prospect of its taking place in twenty-four hours. He admits, however, that cases may and do occur, in which a longer delay might be advisable; though he has not met with such cases. These remarks, of course, refer to the placenta retained *in utero*, and not to cases where it is partly expelled into the vagina; for, when in the vagina, there can certainly be no necessity for waiting at all; it ought to be removed at once. — Editor.

634. Definition.—I would therefore define cases of retained placenta to be those in which the uterus does not, after a due interval of rest, detach or expel the placenta, and which, consequently, require extraction. This interval may be fixed at an hour and a half, or thereabouts, for ordinary cases; but, on the one hand, more time may be required if the fatigue have been excessive, and on the other, prompt interference will be necessary, if hemorrhage supervene.

635. Statistics.—The following table will enable us to estimate its frequency, causes, and, in some measure, its consequences.

Authors.	Total Number of Cases.	Retained Placenta.	Inertia.	Irregular Contraction.	Morbid Adhesion.	Mothers lost.
Mr. Giffard . .	. .	24	3	7	11	3
Mr. Perfect . .	. .	19	2	14	3	4
Dr. Jos. Clarke .	10,387	21	. .	5	. .	5
Dr. Ramsbotham	. .	27	2	1	24	10
Dr. Granville . .	640	7				
Edin. Hospital .	2,452	6	. .	. .	. .	6
Dr. Cusack . .	701	22	. .	5	. .	1
Dr. Maunsell . .	416	2				
Dr. Collins. . .	16,414	66	37	19	10	6
Dr. Reid . . .	3,250	32				
Dr. Beatty . .	783	1	1	. .	. .	1
Mr. Lever . . .	4,666	37	22	. .	15	
M. Riecke . . .	219,303	188				
A. E. v. Siebold .	238	8	1			

From this it appears that in 259,250 cases, it occurred 392 times, or about 1 in 661⅓. In 186 cases, when the result to the mother is given, 36 died, or about 1 in 5: but much allowance must be made for this excessive mortality, owing to mismanagement on the part of midwives before an accoucheur is called in. The immediate cause of death is generally hemorrhage.

636. Causes and Treatment.—The principal causes of retention of the placenta are: 1. Inertia of the uterus. 2. Irregular contraction of the uterus: and 3. Morbid adhesion between the uterus and placenta. These we shall consider separately with their treatment.

1. *Inertia of the uterus.*—I have already stated that the contractions which expel the child may detach partially or wholly the placenta, or it may be unaffected by them: in this state it will of course remain until the recurrence of uterine action. But cases not unfrequently occur in which the uterus remains quiescent after expelling the child, owing sometimes to the length and severity of the labour, and sometimes apparently to a peculiarity of uterine constitution; in other words, to a cause unknown. Now if in such cases the placenta be entirely adherent, no evil consequences will result for some time; there is, of course, the risk of a partial separation occurring, and a secondary risk from decomposition if it remain long enough: but there is no immediate danger. On the other hand, if it be partially or wholly detached, and lying in the uterus, the separation will have exposed many large vessels, and the absence of uterine contraction permits the uncontrolled escape of blood, so that in these cases

there is generally more or less flooding—it may be even to a fatal extent: therefore, in addition to the more distant danger, which these cases share in common with the former, there is immediate danger from hemorrhage of the most urgent kind.

If the hand be placed upon the abdomen, the uterus is felt large and flabby, without any of the firmness which is its characteristic in a state of active contraction.

637. *Treatment.* — The promptitude of our interference depends entirely upon the presence or absence of flooding. If there be great hemorrhage, the placenta must be instantly removed either by traction by the cord, or by the introduction of the hand. There is one exception to this rule, however, and that is when hemorrhage has occurred to such an extent that the patient has fainted, and is almost moribund: in this case a very little additional loss may be fatal, even so little as may occur on removing the placenta; but as for the present it is arrested by the syncope, we may postpone the operation until the patient rallies a little, taking care not to wait until the hemorrhage returns.

"If there have already been hemorrhage so profuse as to occasion danger," says Denman, "and the common consequences of loss of blood, as fainting and the like, have already followed, the placenta ought not then to be extracted, nor the patient disturbed, nor any change made, till she is somewhat recovered from her extreme debility; as the danger would be thereby increased, and the patient die, during, or immediately after the operation, as I have seen and known in several instances."

There may, however, be no flooding: and in some cases it might be possible to remove the placenta by a steady pull at the cord, but, to say nothing of the risk of breaking it, we should only be exposing the patient to a risk of hemorrhage by withdrawing the placenta whilst the uterus was relaxed. The best plan is first to try and excite the uterus to contract by friction and pressure upon the abdomen, and to draw by the cord steadily and firmly. If the uterus still remain inert, we are recommended by M. Mojon, and some continental practitioners, to inject the umbilical vein with cold water, so as to stimulate the uterus by the impression of cold. I have mentioned this, but I should fear that there would be risk of exciting inflammation by it. I have, however, repeatedly given the ergot of rye in such cases, and with the best effects; when successful, it brings on uterine contractions, and causes the spontaneous expulsion of the after-birth, at the same time that it effectually guards against hemorrhage. If it fail, we have no resource but to extract the placenta by the hand, an operation never to be lightly undertaken, as it is one by no means free from danger. It should be performed very gently and deliberately. The fingers, formed into a cone, are to be introduced into the vagina and os uteri, in the axis of the outlet and brim, guided by the funis, and so gradually up to the placenta, which may be grasped by its inner surface, as Hamilton and Burns recommend, or the finger may be gently insinuated between it and the uterus, so as to peel it off very carefully and gently. Great care must be taken on the one hand, not to injure the surface of the uterus, and, on the other, to remove the whole of the placenta; and having done this, the detached mass should be grasped, and the uterus, which by the operation will be excited to action, allowed to expel both it and the hand. By so doing we shall secure its contrac-

tion, and guard against hemorrhage, and meanwhile external pressure should be exerted by the other hand, and maintained by compresses and the binder.

This operation should never be performed without clear conviction of its necessity, as it is by no means without danger: Dr. Denman observes that although "it is often mentioned as a slight thing, yet I am persuaded that every person who attends to the consequences of the practice, will think it of importance, and that, if possible, it always ought to be avoided."

After the operation, we must remain some time with the patient to be sure that the uterus does not again relax and hemorrhage ensue, and for some time watch carefully lest inflammation should set in.

638. 2. *Irregular contraction.* — After the delivery of the child in ordinary cases, the uterus closes equally over the after-birth, pressing it on all sides, and forming a globular tumour in the abdomen. There are occasional though rare exceptions, however, to this equal contraction, in which the uterus contracts unequally and yet forcibly, and so far from effecting the expulsion of the placenta, which is the principal object of its contraction, it is thereby effectually retained. This irregular contraction sometimes follows natural labour, but more frequently labour with malpresentation or instrumental delivery, and it is attributed (not without justice, I think) in some cases to the action of the ergot of rye.

There are three kinds of irregular contraction which may be briefly noticed: 1. The first is seldom noticed in books, and yet it is of frequent occurrence. It appears to consist in a contraction of the fibres of the cervix uteri to a greater degree than of those of the body and fundus. If the hand be placed upon the abdomen, the uterus is to a certain degree, but not firmly, contracted, whilst if the finger be passed into the os uteri, the cervix is found to be hard and contracted, and the cord when pulled does not *give*. The placenta is sometimes adherent, but more frequently partially or wholly detached, and a portion of it may often be felt in the os uteri. In common with other varieties of irregular contraction there is sometimes hemorrhage, but frequently none at all, and the necessity for interference chiefly arises from the indisposition of the uterus to rectify the irregularity and expel the after-birth. The globular tumour, moderately contracted, the narrowed os uteri, and the firm retention of the placenta, even when partially or wholly detached, will distinguish these cases from all others.

2. The second irregular contraction is that which has received the name of "hour-glass contraction." The band of fibres around the body of the uterus are thrown into a state of permanent contraction, the remaining portion being only in a state of moderate action, giving to the uterus something of the figure of an hour-glass, and dividing its cavity into two chambers, an upper and a lower, in the former of which the placenta is mainly or entirely contained. It may be entirely adherent, or partially or wholly detached, though seldom the latter. Occasionally there is hemorrhage. This variety of irregular contraction has been attributed to the too rapid passage or extraction of the child; to a lingering labour with women of an irritable constitution, and to the partial action of ergot. My friend Dr. Douglass thinks that hour-glass contraction rarely or never occurs without morbid adhesion of the placenta. Drs. Campbell and F.

Ramsbotham deem it a very rare occurrence. It is very seldom that we can discover any irregularity of form in the uterus by placing the hand on the abdomen, and, in consequence, the diagnosis is very obscure, until the hand is introduced for the purpose of extraction.

3. The third irregularity is a preponderating contraction of the circular fibres of the uterus, throwing the organ into the shape of a long cylinder, so that it feels narrower than usual; and instead of a globular tumour just above the pubis, it is often felt reaching up above the umbilicus, and internally it may be difficult to reach to the fundus. As in hour-glass contraction, there is not always flooding, and the causes are probably the same. The diagnosis is aided, however, by the shape of the uterus, although it is often sufficiently obscure.

639. *Treatment.*—The first variety of irregular contraction can generally be remedied without the introduction of the hand. Steady and firm traction should be made by the cord in the axis of the brim, and maintained for some time without relaxation: this in many cases overcomes the spasmodic action, and the placenta is rather suddenly released. If it fail, one or two fingers introduced within the os uteri may be sufficient, as they may be able to seize a portion of the after-birth, and so aid in the traction. I have seldom found it necessary to do more than this; but of course if it do not succeed, the placenta must be extracted by introducing the hand carefully and gently as before described.

In the second and third form of irregular contraction, traction by the cord is quite ineffectual, so firmly is the placenta grasped. We can only wait, therefore, until we are satisfied that it will not be separated and expelled naturally, and cannot be withdrawn by the cord, and then at once proceed to extract it.* The introduction of the hand is to be effected in the way already described, until we arrive at the contraction, which is to be overcome by gentle but steady pressure of the points of the fingers gathered into a cone, and when we reach the placenta, we must remember to detach the whole, and to allow the hand to be expelled by the uterus. In the hour-glass contraction, the lower chamber is so complete, and the contraction so close, that persons have suspected that the aperture through which the cord was traced was in fact a laceration: a little patience and perseverance, however, will show the true state of the case, and, besides, although the child often escapes through a laceration into the abdomen, it is very rare for the placenta to do so.

Opium and venæsection have both been recommended for the relief of irregular contraction; but I quite agree with Dr. Ramsbotham that both are objectionable.

Let me again impress upon my readers the necessity of great care to secure the regular, equal, and permanent contraction of the uterus afterwards.

640. 3. *Morbid adhesion of the placenta to the uterus.*—Many of the diseases of the placenta to which I have heretofore (§ 180) referred, may occasion adhesion between its outer surface and the inner surface of the uterus. Thus inflammation may end in the effusion of lymph connecting

* As in hour-glass contraction there can be no reasonable hope of a spontaneous expulsion of the placenta, the moment the existence of such a contraction is ascertained, there should be no delay; the accoucheur should proceed at once to effect its delivery by manual interference. — EDITOR.

the two, or in induration. Again, the adhesion has apparently been effected by calcareous or scirrhous deposition.

The space occupied by the adhesion is generally limited.

This accident is manifestly the result of disease during pregnancy, and has no relation to the kind of labour. It is much more dangerous than irregular contraction, because the uterine action generally detaches more or less of the placenta; but the adhesion retaining the mass in the uterus, prevents its contraction and the closure of the bleeding orifices of the uterine vessels. We find, therefore, more or less flooding, sometimes to an enormous extent. Almost the only exceptions are the few cases where the adhesion is very extensive, and the detached part small.

The diagnosis is in almost all cases impossible, until the extraction is attempted: a strong suspicion will be excited, however, by the occurrence of pains, without extrusion of the after-birth.

641. *Treatment.*—As we cannot be sure that the retention arises from adhesion, we must only have recourse to the usual preliminary means, and, finding them ineffectual, to extraction. The hand is to be introduced in the usual manner, and on trying to separate the placenta, we shall discover that some part of it is closely adherent, as it were amalgamated with the uterus. It would be extremely wrong to use violence in endeavouring to detach it; if, therefore, we cannot easily effect this, it is better to peel off the placenta all round up to the adhesion, and then to separate the loose part from the adherent portion close round the adhesion, leaving the latter in the uterus to soften and come away with the lochia.

In a case of Dr. Smellie's, in which he removed the indurated and adherent portion, the patient died of hemorrhage; and several such cases are on record.

It cannot be denied that danger may arise from the decomposition of what remains; but we have no means of avoiding it, except by care afterwards. If the discharge be very offensive, vaginal injections of tepid milk and water should be used twice a-day, and any symptoms of inflammation *promptly treated.*

642. The extraction of the placenta may be rendered necessary by the rupture of the cord, inasmuch as we can afford no assistance; but it is by no means so easy, as we lose the guide it affords us into the os uteri and to the situation of the placenta. In such a case, of course, we must first try fairly what the natural powers, stimulated by friction, will effect, and if they fail, the hand must be introduced with greater caution, and the placenta very gently sought for, and detached in the usual manner.

Once more let me repeat the necessity of removing all the placenta, for a small portion left behind may render all our exertions fruitless as to the result.

I have deferred the consideration of the treatment of the hemorrhage until the next chapter, as I preferred limiting this chapter strictly to the management of retained placenta; the two chapters should, therefore, be taken together.

CHAPTER XX.

PARTURITION. — CLASS III. COMPLEX LABOUR.

ORDER 3. FLOODING.

643. There is no deviation from the ordinary course of labour so trying to the medical attendant, as flooding; not only on account of the imminent danger, but from the sudden and rapid progress of the attack, and the impossibility of waiting for assistance. Nothing can preserve our calmness and presence of mind under such circumstances, but understanding the subject clearly beforehand, and being perfectly prepared for meeting each variety of the accident with its appropriate treatment.

I have already spoken of the hemorrhage accompanying abortion, and it remains now for us to consider those forms of flooding which occur just grevious to or during labour, and afterwards. During the last month of pestation and at the commencement of labour, patients are exposed to two forms of hemorrhage, differing in their causes, but depending upon the situation of the placenta. The first has been called "*accidental hemorrhage*," because it arises from a partial and accidental separation of the placenta, which occupies its usual situation; and the second is justly termed "*unavoidable hemorrhage*," because, the placenta being placed partially or wholly over the os uteri, the dilatation of this orifice will unavoidably separate the after-birth and give rise to hemorrhage: as Naegelè has observed, "the very action which Nature uses to bring the child into the world is that by which she destroys both it and its mother." After delivery, flooding may occur to any extent and from various causes.

Each of these varieties of hemorrhage will require a separate and careful consideration. But first let us ascertain their frequency and mortality as far as possible.

644. Statistics:—

Author.	Total No. of Cases.	Flooding Cases.	Mothers lost.	Children lost.	Accidental hemorrhage.	Mothers lost.	Unavoidable hemorrhage.	Mothers lost.	Hemorrhage after Labour.	Mothers lost.
Mr. Giffard	..	35	6	14	1	..	19	5	5	1
Dr. Smellie	..	34	13	16	6	3	24	8	3	2
Mr. Perfect	..	18	6	7	8	2	6	3	2	1
Dr. Bland	1,897	9	3	8						
Dr. Jos. Clarke	10,387	24	5	10	10	4	4	1	10	
Dr. Merriman	2,947	32	1	14	21	..	4	1	5	
Dr. Granville	640	2	..	..	1	..	2			
Dr. Ramsbotham	..	69	30	13	19	8	44	16	26	6
Edinburgh Hospital	2,452	31	3	..	1	1	2	1	28	1
Dr. Collins	16,414	131	12	17	13	2	11	2	107	8
Dr. Cusack	701	15	..	..	6	..	..	..	5	
Dr. Maunsell	839	110	1	..	..	..	5	1	6	1
Dr. Beatty	1,182	6	1	..	..	..	4	0	2	1
Mr. Lever	4,666	51	4	7	16	..	13	2	35	2
Mr. French	89	5	..	..	..	..	1			
Dr. R. Lee	..	47	10	..	24	4	23	6		
Dr. Reid	3,250	52	..	..	22	..	3	..	27	
Mr. Warrington	110	4	..	1	..	..	2	..	2	
Dr. Churchill	1,640	25	0	0	3	0	1	0	21	0
Drs. M'Clintock and Hardy	6,634	93	..	..	29	4	8	3	56	7
Dr. Richter	624	5	..	..	..	..	5			
A. E. v. Siebold	730	9	2	1	..	..	3	2	6	0
Dr. Voigtel	29	1	0	1	..	..	1	0		
Dr. Jansen	13,365	11	..	..	4	..	7			

From this table we find that in 75,596 cases, hemorrhage occurred 517 times, or about 1 in $146\frac{1}{4}$; out of 630 cases of hemorrhage, 111 mothers were lost, or about 1 in $5\frac{1}{2}$: out of 443 cases, 109 children were lost, or about 1 in 4.

Further, out of 114 cases of accidental hemorrhage, 28 proved fatal, or nearly 1 in 4; out of 182 cases of unavoidable hemorrhage, 51 proved fatal, or nearly 1 in $3\frac{1}{2}$; and out of 293 cases of flooding after delivery, 22 proved fatal, or about 1 in 12.

645. 1. Accidental Hemorrhage. — In these cases, as I have said, the placenta is in its ordinary situation; it may be at any part of the uterine parietes except the cervix, as then the case would come under the class of unavoidable hemorrhage. The immediate cause of the flooding, is the separation of some portion of the placenta from the womb and the laceration of its vessels: as these cannot be closed by the uterine contraction, of course the blood is poured out freely. The amount of the loss is said to be in proportion to the extent of the surface exposed, and, perhaps, in many cases this may be true, but there are striking exceptions: fatal hemorrhage may take place from a space not more than an inch square. In some rare cases, a portion of the centre of the placenta is detached and a cavity formed which is filled with blood, but as it is surrounded with adherent after-birth, of course none escapes externally. Or it may extend beyond the placenta, and be retained by the adhesion of the membranes or other causes. "In such cases," Dr. Burns remarks, "the effusion is accompanied with dull internal pain at the spot where it takes place. This pain is something like colic, or like the pain attending

the approach of the menses. The part of the womb where the extravasation takes place, swells gradually, and in a short time the uterus feels larger. If the quantity be considerable, the size increases, the uterus is felt to be firmer and tenser, as well as larger, the strength diminishes, and some faintings may come on. In course of time, weak slow pains are felt, but if the injury be great, these decline as the weakness increases. They may or may not be attended with the discharge of coagula from the os uteri." The hemorrhage, in fact, is at first internal, and generally, though not always, becomes external. Dr. Burns suggests that in some cases the bleeding may be the result of a separation of the decidua, and a laceration of the vessels running to that membrane from the inner coat of the uterus, and not from a separation of the placenta.

646. Causes. — Violent shocks, such as blows, falls, &c. may have the effect of detaching a portion of the placenta, and in some cases a very slight shock will be sufficient; I was called to a case the other day in which it was effected by a hearty fit of laughter. Besides these causes, fatigue, over-exertion, violent straining at stool, lifting heavy weights, excessive action of the utero-placental vessels, disease of the placenta, general plethora, spasmodic action of that portion of the womb to which the placenta is attached, may be equally effective. Dr. Burns observes, "we sometimes find that extravasation is produced by an increased action of the uterine vessels themselves, existing as a local disease. In this case, the patient for some time before the attack feels a weight and uneasy sensation about the hypogastric region, with slight darting pains about the belly or back."

647. Symptoms.—The exciting cause may be instantly followed by the discharge, or preceded by general or local uneasiness, dull pain and aching in the belly and back; and if the hemorrhage be retained, by rigors, tension, and weight in the abdomen, and by faintness. At length, with or without a pain, the discharge commences, varying in amount from a few ounces to a quantity sufficient to compromise the patient's safety.

If it be profuse, the patient faints, of course, and for a time the discharge is arrested; but after she has rallied, it again recurs, and the syncope is repeated. The surface becomes blanched and covered with cold sweat, the countenance sunk, with dark circles around the eyes, the pulse becomes weak, quick, and fluttering. If the flooding be not arrested, all these symptoms increase; the sight becomes dim, there is a ringing in the ears, frequent sighing, intolerable restlessness, uneasiness, and jactitation, and death; preceded by fainting or convulsions.

Labour pains may come on at some period of the discharge, or they may be entirely absent; a good deal will depend on the period of pregnancy at which the complication occurs. If they do, it will be observed that during a pain the hemorrhage is arrested, but that it returns on the cessation of the pain.

If an internal examination be made, the os uteri will seldom be found dilated unless there have been pains for some time, but the cervix is generally softened and relaxed by the hemorrhage; and what is of great importance, in most cases we can pass the finger within the os uteri sufficiently to ascertain the presence of the membranes, and that no part of the placenta is within reach.

648. Diagnosis. — The diagnosis of accidental from unavoidable hemorrhage is of extreme importance, inasmuch as the treatment of the two is essentially different. There are three points in which the two varieties differ remarkably, and which will enable us to distinguish them. In the first place, we can generally make out some definite external cause for accidental hemorrhage, and its occurrence is accidental and irregular, whereas in unavoidable hemorrhage, the only exciting cause is the expansion of the cervix, and the time of its first occurrence has a certain degree of regularity. Secondly, in accidental hemorrhage the discharge takes place freely, during an interval, but is at once arrested by a pain during its continuance; but in unavoidable hemorrhage the discharge, which continues also during the intervals, is greatly increased during the pains. Thirdly, in cases of accidental hemorrhage, the os uteri is free, closed by membranes only, and the cervix is of equal thickness all round, whereas in placenta prævia the os uteri is more or less covered by the after-birth; or if it only reach to the edge of the cervix, the latter is felt to be considerably thickened at that part.

Lastly, in many cases we may ascertain the situation of the placenta by the stethoscope, and its presence in the body or fundus of the uterus will decide the case to be one of accidental hemorrhage.

649. Treatment. — The indications of management must be drawn from the period of pregnancy, the state of the os uteri, and amount of discharge.

Let us suppose that the patient has not arrived at her full time, that she has no pains, that the os uteri has not begun to dilate, and that the discharge is not profuse. In such a case the patient is not in immediate danger; and as prompt delivery would be difficult, it may be well to temporise, and see how far we can arrest the discharge. For which purpose the patient should be placed in a bed on a hard mattrass, and very lightly covered with bed-clothes; the temperature of the room should be reduced very low, and nothing but cold drinks allowed. Enemata of cold water exert a very powerful control in such cases. The plug may be used (according to the restrictions formerly laid down), inasmuch as the uterus being full, there is little danger of internal hemorrhage to any extent. The best plug is common tow, or one or two silk handkerchiefs; and the object will not be attained unless the vagina be quite filled.

Internally we may give the acid mixture, with a large proportion of acid; for instance, half an ounce of dilute sulphuric acid to six ounces of infusion of roses; an ounce to be taken every hour. To tell the truth, I think it is more highly estimated than it deserves. Lead in large doses (gr. x. Acet. Plumb. 2dis horis) has been recommended: Dr. Conquest speaks favourably of it. It may be combined with opium or either may be given separately. I have no doubt of the beneficial effects of opium either in large doses (gr. ii.; or gtt. lx. Træ. Opii), or repeated small ones.

Large drinks of cold water alone, or with the addition of the nitrate of potash, seem beneficial. Of course the patient cannot be allowed to sit up, or to leave her bed, and it is an advantage to free the bowels by enemata, as involving less effort in the evacuation.

650. There are many cases in which, under this treatment, the discharge is diminished, and the patient carried to her full time in safety; but

in others it will fail, either on account of the increase of the discharge or because the pains of labour are brought on. In these cases, as well as in those where the amount of discharge is great from the beginning, another line of treatment is necessary, which would be very doubtful in the former case. I have said that the discharge is observed to cease during a pain, and the reason is simple. During a pain the placenta is pressed against the contents of the uterus on the one hand, and against the bleeding vessels on the other, and by its pressure, as by a tourniquet, the flow of blood is arrested. An observation of this fact led to the inference, that if the liquor amnii were evacuated, the pains would be quickened, the pressure increased, and rendered more permanent, besides that the labour would be sooner terminated. As Dr. F. Ramsbotham has remarked, "the vessels of the uterus are diminished in size by the contractions of the uterine parietes; the open orifices are in a degree plugged by the parietes being brought into closer and stronger contact with that portion of the placental mass disunited from the uterine surface; and the pains are usually increased in frequency and power by the augmented stimulus impressed upon the os uteri." Moreover, in these cases of large flooding, we need not anticipate the usual delay in the dilatation of the os uteri; for, as I have mentioned, the hemorrhage softens the cervix uteri, and prepares it to yield easily to the pressure of the head.

In these cases, therefore, when the flooding is profuse, and the danger imminent, the membranes should be ruptured by the finger or a female catheter. Soon afterwards, we find the pains increase, the flooding diminish, and the labour advance.

For the clear understanding of the principles of this practice and the cases to which it is suited, we are mainly indebted to the late Dr. Rigby of Norwich, who published his valuable essay on "Uterine Hemorrhage," in 1775, although the plan was first recommended by Julian Clement and Puzos.

That the plan is very successful, we have the testimony of many authors, as Denman, Baudelocque, Merriman, Ramsbotham, Blundell, &c. Dr. Rigby succeeded by it in 64 cases, without having occasion to turn the child. Dr. Merriman in 30 cases.

Dr. Ramsbotham in 23 out of 25 cases.

Some writers, as Hamilton, Burns, Stuart, &c. have opposed the evacuation of the liquor amnii on the following grounds: 1, that by it gestation is suspended: 2, that it is not certain to bring on labour in time to avoid danger: and, 3, that it may not arrest the hemorrhage, and if not, we must turn and deliver under more disadvantageous circumstances. The first objection is true, but of no value, unless the others be true also; for if the operation succeed, and save the woman's life, which is in danger, the shortening of gestation is of no consequence. The second objection is contrary to general experience, which has established the fact, with very few exceptions, rupturing the membranes does bring on labour sufficiently quick to escape the danger. But supposing it do not, then the third objection is valueless; because, if the uterus be not in action, there will not be greater difficulty in delivering the patient after the evacuation of the liquor amnii than previously; and if it be so much in action as to be a serious obstacle to the operation, we may be sure that the delivery is in better hands than ours, and, with very few exceptions, will terminate well

651. But suppose we meet with one of the exceptions alluded to, in which the rupture of the membranes is not followed by uterine action. We may then try ergot, if the danger be not so great as to preclude delay, or it might perhaps be as well to give it in all cases at the time of rupturing the membranes, if there be no uterine action. If this fail, or in place of it, we ought to try the effect of galvanism, by which Dr. Radford succeeded in cases in which there was no uterine action and a rigid and undilated os uteri. Drs. Hæniger and Jacoby and Mr. Cleveland have also found a favourable result from its employment. If this fail, or be counter-indicated, then we must adopt the plan recommended (without any definite notion of the nature of the case) by Ambrose Parè, Guillemeau, &c. &c., viz. introduce the hand and bring down the feet, thus terminating the labour. The operation will be facilitated by the relaxation produced by the flooding, and though more dangerous for the child, if the mother's safety demand it, it must be done.

The child may be premature, however, the os uteri not dilated, or there may be other reasons why this operation is objectionable, and in such cases, as the os uteri is generally soft and dilatable to a certain extent, I have found it the best plan to perforate the head and extract with the crotchet. The operation is not difficult, nor is there any risk; if the operator be careful to protect the point of the perforator, and afterwards to extract slowly, cautiously, and at intervals.

652. By one or other of these methods, we may almost always succeed in terminating the labour without incurring an additional loss of blood, and if that have not been excessive previously, the mother may be saved. As we have seen, nearly 1 in 3 are lost. There is danger to the child in proportion to the hemorrhage, and additional danger if we are obliged to turn.

There are cases, however, to which we are called after alarming flooding has continued for some time, and although we succeed in delivering the woman, she may die afterwards from loss of blood. In such extreme cases, and such only, transfusion, as recommended by Dr. Blundell, seems to be the only resource. It has succeeded in 14 cases on record; but it has also failed many times. It is performed by means of a syringe and tube: a small tube is inserted into the median or other vein of the woman's arm, and blood from a healthy person is taken up by the syringe, previously warmed, and after expelling all the air from the instrument, its pipe is passed into the small tube, and the blood very slowly forced in. If the lips or eyelids of the patient quiver, or the respiration be more difficult, we must stop, or death may result. If her countenance and pulse improve we may continue. In this manner blood to the amount of sixteen or eighteen ounces may be gradually injected, if necessary; although a much less quantity may save the patient.

Great care must be taken that the instrument be clean, and of a proper temperature, and that the blood be healthy and fluid.

653. In all these cases, a liberal but judicious allowance of stimulants is necessary; but in giving them we must not forget that the subsequent re-action will be somewhat in proportion.

As to the placenta, it is very often expelled immediately after the child, and if it be not, it will be much better to extract it, and secure a firm contraction of the uterus, than to allow the hemorrhage to continue.

After the delivery is completed, the stimulants must be continued, if necessary, or chicken broth may be substituted for them. Notwithstanding the danger of suspending uterine action, I have seen so much benefit from small doses of laudanum combined with ammonia, that I have no hesitation in recommending its exhibition.

The utmost watchfulness will be needed to suppress any return of the hemorrhage, and to enable us to guard against any subsequent attack; for it should always be borne in mind that hemorrhage is by no means a guarantee against inflammation afterwards.

654. 2. Unavoidable Hemorrhage. *Placenta prævia*, *placental presentation*, &c.—In this variety, the flooding is the necessary consequence of the dilatation of the os uteri, by which the connection between the placenta and uterus is separated, and the more the labour advances, the greater the disruption, and the more excessive the hemorrhage. From this very circumstance it follows that the danger is much greater than in the former cases, and also that what in them was the natural mode of relief, is here an aggravation of the evil, and cannot be employed as a remedy.

In these cases the placenta may be situated partially, or entirely over the os uteri (fig. 137), or it may come down only to the edge of the cervix uteri; and there is some difference in the management accordingly.

Fig. 137.

That the placenta was occasionally found at the os uteri was known as early as the time of Guillemeau, Mauriceau, Deventer, Pugh, &c., but they believed that it had originally been situated differently, but had been detached and fallen down. Paul Portal first spoke of it as adhering to this part, in consequence of which he was obliged to deliver by art. Giffard, Levret, Rœderer, and Smellie were also cognizant of this fact, and they seem to have been aware of the mode in which the hemorrhage

was produced, and of its inevitable occurrence. But it is undoubtedly to Dr. Rigby, of Norwich, that the profession is indebted for the full and clear elucidation of the subject. Time, which is the great test of merit, has only confirmed the truth of his observations, and illustrated the value of his essay.

655. The cause of the hemorrhage is evidently the separation of the placenta from the cervix uteri, and the exposure of the mouths of the torn vessels; and this separation is effected and increased by the uterine contractions, dilating the os uteri.

656. Symptoms.—The first discharge is usually about three weeks before labour commences, coincident with the commencement of the process of dilatation already noticed. The amount of the discharge varies, but in general it is not excessive in the first instance, nor is it accompanied with pain. After its cessation the patient rallies; but in a week or two it returns, perhaps in greater quantity, and again ceases, thus continuing (if not interfered with) until the full term. With the first sensible contraction of the uterus, the flooding comes on more profusely, and is observed to increase during each pain. Thus it would go on until death supervened before delivery in most cases, if no assistance were afforded. I say in most instances, because there are some cases on record in which the placenta was forced through the os uteri before or along with the child, decidedly the happiest termination. Thus Smellie and Lee have recorded three; Ramsbotham five; Hamilton two; F. Ramsbotham two; Baudelocque, Perfect, Chapman, Merriman, Barlow, Collins, and Maunsell, one; &c., &c.

Thus far the symptoms are alike (supposing the head to present) whether the placenta be situated entirely or partially over the os uteri or only down to its margin; but the difference is detected on making an internal examination. In the former case the os uteri is felt to be closed by a thick soft spongy mass, firmer than a clot, and not breaking down under the finger, through which the presentation cannot be felt; in the second, this spongy mass stretches over a portion only of the os uteri; its edge can be distinctly felt, and also the membranes covering the remaining portion of the os uteri, through which we may be able to detect the presentation; whilst in the third case the os uteri is closed by the membranes only; but some portion of the cervix is found to be much thickened, whilst the rest is of the usual thickness; in the latter case, after delivery, the perforation in the membranes is found close to the os uteri.

If the feet present, with only a partial implantation of the placenta, or with it coming to the margin of the os uteri only, they may be drawn through the os uteri; and although the detachment of the placenta will increase with the dilatation, yet the flooding will be arrested by the pressure of the body of the child upon the placenta. This may be considered as the most favourable presentation in "placenta prævia," because it saves the introduction of the hand to turn the child.

The effects of the hemorrhage upon the mother are precisely as before described, but produced more rapidly, and more speedily fatal.

657. Diagnosis. — The sudden and apparently causeless occurrence of the first hemorrhage, the increased discharge during a pain, and the detection of the placenta, partially or wholly covering the os uteri, or descending to its margin, are the distinctive characteristics of placenta

prævia; in accidental hemorrhage, as before observed, there is generally some assignable cause, the discharge is arrested during a pain, and the os uteri is closed by the membranes.

There may occasionally be some doubt as to whether the os uteri be closed by a clot or by the placenta; but the former is less firm, and is easily broken up by the finger, and we may often feel the adhesion of the placenta to the cervix within the os uteri.

658. Treatment. — If we are called on the occasion of the first or second hemorrhages, and find that the discharge has not been great, and that the term of pregnancy not being complete the uterus is not in action, we may try palliative treatment, as previously recommended (§ 649), perfect quiet, rest on a hard bed, a cool room, and light clothing, with cold and acid drinks, enemata of cold water, and small doses of opium, if necessary. The bowels must be gently freed. It is hardly necessary to say that in no form of uterine hemorrhage is venæsection admissible.

But the hemorrhage may be so profuse as to demand interference, or if not so at first, it will become so immediately on the commencement of labour; and, from the nature of the case, there is no hope of a natural termination, unless the pains be so violent as to force away the placenta before the child. This occurrence, however, is so rare, that it cannot be allowed to influence our practice, and not a moment is to be lost in waiting for it. Our only plan, therefore, is to terminate the labour, and before the constitution has been seriously affected, if possible. Of course it would be very undesirable to have to force the hand through an undilatable os uteri; but fortunately this is very seldom the case; the repeated losses soften the cervix, so that when we perform the operation, there is seldom more resistance than can be easily overcome by gentle, steady, rotatory pressure.

The hand is to be passed in the usual way into the vagina, in the axis of the lower outlet, and its direction immediately changed into that of the brim, which will bring the points of the fingers near to the os uteri, into which they are to be gently yet firmly insinuated, and then passed between the placenta and cervix, on that side on which we believe the placenta to be narrowest, until it arrive at the membranes, which must be pierced, and the feet found and brought down. Some writers, Smellie and Mohrenheim, for instance, have proposed to perforate the placenta, instead of passing the hand between it and the uterus: this is by no means easy, and appears to me extremely objectionable. When the body of the child is in the pelvis, it will act as a tourniquet, and the flooding will cease; nevertheless, it is well not to delay the delivery, as internal hemorrhage might occur. The mode of completing it I have already described: it is rarely that the child is saved.

In placental presentation, even more than in accidental hemorrhage, it is desirable to extract the placenta if it do not follow the child immediately, and the same care and watchfulness will be necessary to secure a good permanent contraction, and to guard against subsequent hemorrhage. Pressure above and over the uterus should be made with compresses and the binder, and if there be much draining, cold must be applied to the vulva, or cold enemata administered.

659. It is an advantage if the foot present, even when the placenta covers the os uteri, because the operation of turning is rendered easier;

but when the os uteri is only partially covered, this is still greater, because by rupturing the membranes we facilitate the descent of the feet, and have only to seize them in the vagina and extract the child.

When the placenta reaches only to the margin of the os uteri, the case is truly one of unavoidable hemorrhage; but yet it admits of the same treatment as accidental hemorrhage, no matter what be the presentation, for after rupturing the membranes, the pressure of the head whilst dilating the os uteri will close the mouths of the bleeding vessels with the placenta, and so arrest the flooding until the child is expelled. This I have found by repeated experience, and therefore, when we are certain of the case, and pains are present, our duty is limited in the first instance to evacuating the liquor amnii; but if this fail we must turn and deliver the child.

660. Such has [illegible]berto the mode of proceeding recommended by practitioners of the [illegible] authority; it remained for my learned and ingenious friends, Dr. H[illegible]rd and Prof. Simpson, to propose another which at first sight is remarkable mainly for its boldness, but which Prof. Simpson has supported with his usual research, and which is at present the subject of fierce controversy.

I have already stated (§ 656) that the placenta is sometimes expelled before the child, and that the mother is not always lost in these cases. Now, it appears that these instances are not so rare as was supposed. Dr. Simpson has collected 56 published cases, and he has been furnished with 74 unpublished ones (130 in all), in which the placenta was either expelled or extracted first; and he finds that in all, 10 women died, or about 1 in 13: and of 110 cases the infant was born dead in 73 or 69 per cent., and alive in 33 or 31 per cent., *i. e.*, nearly 1 in 3 children was saved. In placenta prævia, under ordinary management, 1 in 3, or thereabouts, of the mothers are lost, and more than half of the children.

Taking this as a basis of his proposal, Dr. Simpson advises us in certain cases to substitute extraction of the placenta for turning the child. In justice to the Professor, it must be remembered that he does not intend that this plan should in every case supersede either the rupture of the membranes or turning the child.

Dr. Lee, of London, who has entered into controversy with Dr. Simpson, with somewhat less of courtesy and accuracy than might have been expected, has objected to the proposed plan: — 1. That the mortality, as stated by Dr. Simpson and me, is exaggerated; but, in my opinion, he is far from having proved this. 2. That it was never practised by the older accoucheurs; but this would equally be an objection to any improvement. 3. That the child must inevitably be sacrificed; this would be a very serious objection, if the mortality among the children in the ordinary mode of treatment were small, but it is so great that it is an insufficient argument on which to reject the operation.

The probability of hemorrhage after the extraction of the placenta would most likely occur to any one as an objection; but Dr. Simpson states that "in 19 out of 20 cases in which it has happened, the attendant hemorrhage has either been at once arrested, or it has become so much diminished as not to be afterwards alarming." This Dr. Simpson attempts to explain by the supposition that the bleeding proceeds almost entirely from the placenta, and not from the uterus. But Dr. Lee contends, and I think correctly, that it escapes from the uterine sinuses laid bare by the detach-

ment of the placenta. Dr. Ashwell advocates this view, and, with others of high authority, decidedly opposes Dr. Simpson's plan of extraction.

661. Let us next see in what cases it is proposed to have recourse to this novel operation, and then we shall be in a condition to investigate its merits better. Professor Simpson thus states the circumstances in which he would recommend it: — "When the hemorrhage is so great as to show the necessity of interference, and is not restrainable or restrained by milder measures (such as the evacuation of the liquor amnii), but at the same time turning or any other mode of immediate or forcible delivery of the child is especially hazardous or impracticable in consequence of the undilated or undeveloped state of the os uteri, the contraction of the pelvic passages, &c. Or, again, the death, prematurity, or non viability of the infant may not require us to adopt modes of delivery, for its sake, that are accompanied (as turning is) with much peril to the mother, provided we have a simpler and safer means, such as the detachment of the placenta, for at once commanding and restraining the hemorrhage and guarding the life of the parent against the dangers of its continuance. Hence, as I have elsewhere stated, I believe that the suppression of the flooding by the total detachment of the placenta, will be found the proper line of practice in severe cases of unavoidable hemorrhage, complicated with an os uteri so insufficiently dilated and undilatable as not to allow of version being performed with perfect safety to the mother; — therefore, in most primiparæ; in many cases in which placental presentations are (as very often happens) connected with premature labour and imperfect development of the cervix and os uteri; in labours supervening earlier than the seventh month; when the uterus is too contracted to allow of turning; when the pelvis or passages of the mother are organically contracted; when the child is dead; when it is premature and not viable, and where the mother is in such an extreme state of exhaustion as to be unable, without immediate peril of life, to be submitted to the shock and dangers of turning or forcible delivery of the infant. This enumeration is far from comprehending all the forms of placental presentations that are met with in practice; but it certainly includes a considerable proportion of the cases of this obstetric complication; and among them, all, or almost all, of the most dangerous and most difficult varieties of unavoidable hemorrhage. In adopting the practice, one error, which I would strongly protest against, has been committed in some instances. Besides completely detaching and exhausting the placenta, the child has been subsequently extracted by direct operative interference. If the hemorrhage ceases, as it usually does, upon the placenta being completely separated, the expulsion of the child should be subsequently left to nature, unless it present preternaturally, or the labour afterwards show any kind of complication, which of itself would require operative interference under any other circumstances. Both to detach a placenta and extract a child would be hazarding a double, instead of a single operation."

Dr. Radford states that the placenta ought never to be detached in such cases unless, "1. the danger to the woman is so great from exhaustion as to render the ordinary plan of delivery by turning the child hazardous. 2. When there exists some obstacle to the extraction of the child, either from distortion in the bones of the pelvis, or tumours connected with it, or in its cavity, but connected with the soft parts. 3. When the child is

dead. Subsequently, he protests against the operation until the cervix and os uteri will allow the introduction of the hand, as that "is the only instrument by which the placenta should be detached; indeed, I hesitate not to say, that it cannot be safely and effectually separated by any other means."

Dr. Edwards thus sums up the cases in which this practice seems admissible. 1. When the patient is of so weakly and delicate a constitution, that loss of blood to any great extent would be attended with present danger and subsequent injurious effects. 2. When the child is well ascertained to be dead. 3. In cases in which the powers of life have been excessively lowered by the hemorrhage, and the os uteri remains firm and unyielding. 4. In cases in which, although the os uteri is dilatable, the powers of life would be unequal to the shock of turning. 5. In primiparæ, when the soft parts are so contracted that they would be liable to be bruised or torn in turning. 6. In contracted pelvis.

662. We shall now examine in detail the practical value of this operation in the cases proposed, so far as our facts will permit, and assuming the correctness of Dr. Simpson's statistics. The rates of mortality by the ordinary treatment, I believe to be about 1 in 3 of the mothers, and 65 per cent. of the children, according to a statement of Dr. Lees, quoted by Dr. Simpson, *i. e.*, of course, taking large numbers. According to Dr. Simpson, when the placenta has been first expelled or detached, the mortality is 1 in 14 of the mothers, and 69 per cent. of the children. So far there appears to be an important advantage gained by the new method, but it will be found on further inquiry, that there are great difficulties, if not insurmountable objections to it.

1. There appears to me great practical difference between the placenta being expelled first, and extracted first, although Dr. Simpson makes none, but includes both equally in his statistical table. The former is the result of vigorous uterine action, the latter may or may not be accompanied by it, and I think there is much force in the doubt expressed by Mr. Barnes, as to whether the results would be as favourable in cases of detached as of expelled placenta. The 17 cases quoted from Dr. West, by Dr. Simpson, are much too few for proof. Dr. Radford has given two tables, the first of 41 cases, and the second of 14 cases, in which the placenta was separated and detached by the hand, and of these 5 mothers were lost, or 1 in 11, and 7 children saved, or 1 in 8. Of 20 no information is given. We must remember that in the one case there is no irritation, no force applied to the cervix and os uteri: in the other there must be.

2. This distinction between detached and expelled placenta, alters the ratio of mortality among the children fearfully. Dr. Simpson has recorded in his tables but one case of the child being born alive, when the interval after the expulsion or extraction of the placenta was more than 10 minutes, and 16 of the 17 children, in the cases quoted from Dr. West, were lost. If any attempt be made to save the child by artificial delivery, this will be to "incur the hazard of a double operation," and will defeat the object of Dr. Simpson's proposal.

3. In Dr. Simpson's first table of 47 cases, with an interval after the expulsion or extraction of the placenta of from 10 minutes to 10 hours before the birth of the child, I find that delivery was completed by art in

18 cases; in 14 of them by turning. In the second table of 21 cases, where the interval was less than 10 minutes, in 7 cases by turning, and in 1 by evisceration. In the third table of 27 cases, where the child came with the placenta, or followed immediately, there are 5 cases of turning, and 1 of extraction recorded. In the fourth table, of 27 cases, where the interval is unknown, delivery was effected by turning in 15 cases, by the forceps in 2, and by decapitation in 1.

From this it appears that in a very large proportion of cases (46 cases in 119), artificial delivery was necessary, in many no doubt from mal-presentation; but still in these cases detachment of the placenta alone would have been useless, in many injurious; nor if the operation were performed before the dilatation of the os uteri could the mal-presentation have always been ascertained. Again, we find that delivery by art was more frequent, according as the interval after the separation of the placenta was prolonged, and I should suppose, although Dr. S. does not mention it in his tables, that the interval would be much greater in cases where the placenta is extracted, than where it is expelled, and, consequently, that the probability of a second operation being necessary, would be greater in such cases, which would constitute another important difference between these two classes of cases, or, as Dr. Simpson admits, would double the hazard.

Of 41 cases given by Dr. Radford, "in 18 turning was performed, in 6 it is presumed to have been so, in 1 the child was drawn by the presenting leg, 16 were terminated by the natural efforts, 1 by the vectis, 1 by the perforator and crotchet." In table 2d, of 14 cases, 2 were terminated by the natural efforts, 10 by turning, 2 by the forceps.

4. The first class of cases in which Dr. Simpson thinks this new method advisable, is where the hemorrhage is excessive, and the os uteri undilated and undilatable. Now although it is evident that so long as this state continues (fortunately it is rather the exception than the rule) turning is impracticable, I confess I do not see how the placenta can be easily or safely detached. I put out of the question using any instrument but the finger for this purpose, for I quite agree with Dr. Radford that any other would be extremely hazardous to the mother under such circumstances. And I concur with him that "in those cases of unavoidable hemorrhage which occur before the expansion of the cervix uteri, it would be quite impossible to force the finger along the cervical canal, and reach the edge of the placenta, so as entirely to detach it; and in those cases which occur at the latter part of pregnancy or b ginning of labour with a rigid os uteri, it appears to me to be out of the power of the operator with the finger alone to reach so far as the edge of the placenta." It must also be borne in mind that Dr. Simpson's favourable rate of mortality does not apply to this class, as there are no statistics of such cases.

5. "In premature labours, with an undeveloped os uteri," there will be the same difficulty in detaching the placenta, whether the child be viable or not, and we are in the same ignorance of what would be the result to the mother.

6. In a great number of the cases in Dr. Simpson's tables (23 in 91), as we have seen, the presentation was abnormal, of the shoulder, arm, or hand and head, and in such cases artificial delivery must take place, and it may be a question whether if we first merely removed the placenta, on

account of the exhaustion of the mother, we should not thereby increase the difficulty of turning at a subsequent period.

7. In the cases mentioned by Drs. Simpson, Radford, and Edwards of distortion of the pelvis, or tumours in the soft parts offering an obstacle to the extraction of the child, the new operation would not be exactly an alternative, but a substitute, as version would be out of the question in most instances, and the doubt remains, whether it could be effected if the obstacle were great. If it could, it might facilitate the use of the perforator and crotchet.

8. In cases of extreme exhaustion, where the mother is unable to bear the shock of turning or any additional loss of blood, if the os uteri be dilated or dilatable and the circumference of the placenta within reach; as the hemorrhage is said to cease after the removal of the placenta, the operation may be admissible for the purpose of gaining time, even with the chance of artificial delivery afterwards.

9. In cases where the flooding is considerable, the presentation natural, and the pains strong (the cases in which the placenta is sometimes expelled before the child), there seems to be no objection to arrest the hemorrhage by the removal of the placenta, leaving the conclusion of labour to the natural powers, either alone or stimulated by galvanism, as Dr. Radford has proposed. To those two classes the results of Dr. Simpson's statistics almost exclusively apply.

I have thus examined with care this very difficult subject, and although I would be far from pronouncing dogmatically upon it, I feel bound in duty to state, that except in the cases I have mentioned, I could not consent to substitute the new method of treatment for the old, and even in those cases I would recommend the very utmost caution.*

The necessary stimulants and support must be afforded as in accidental hemorrhage, and if the patient be extremely sunk and exhausted, we may have recourse to transfusion.

663. 3. Hemorrhage after Delivery. — A certain amount of blood is always lost after delivery, nor is this injurious; and it is only when it is so great as to produce an impression upon the constitution and the pulse that it is to be considered as flooding. Of course, in all cases it escapes from the mouths of the vessels, exposed by the partial or entire separation of the placenta, not being closed by firm uterine contraction.

It sometimes, but rarely, takes place when an interval elapses between the expulsion of the head and body of the child, but much more frequently after its birth, before or after the expulsion of the placenta. Secondary flooding also sometimes occurs at a distance of ten or twelve days after delivery, generally owing to some imprudence on the part of the patient.

The hemorrhage after the expulsion of the placenta may be the result

* "Messrs. Simpson, Radford, and the other gentlemen who advocate the new method in placenta prævia," remarks Dr. Meigs (*op. cit.*), "very earnestly recommend the prompt separation of the whole of the placenta; and they are persons whose opinions are justly to be esteemed of the greatest weight; but notwithstanding the profound respect with which I receive any statement of theirs, I cannot but think that in any case in which it is possible to detach the *whole* of the placenta, it would be also possible to introduce the whole of the hand, and thus commence at once the operation of turning, which ought to be esteemed as the essential indication of treatment in placenta prævia, and which the earlier it is done, so much the greater chance does it give both of rescuing the child and saving the woman from fatal losses of blood." — Editor.

of want of contraction of the uterus; but there are severe and even fatal cases which are caused by a limited rupture of the cervix.

I have in the last chapter spoken fully of retained placenta and its treatment, which I shall not now repeat, but shall confine myself to the treatment of the hemorrhage whose effects are similar to those already noticed.

664. Treatment. — Let us suppose, therefore, that the placenta has been extracted or expelled, but that the flooding is not arrested. The first object is to produce a firm and persistent contraction; and to effect this, whilst with one hand we firmly grasp the uterus, with the other cold is to be suddenly applied to the genitals by means of cloths dipped in cold water. The advantage of grasping the uterus is, that we thereby secure an artificial contraction, as it were, until the means employed effect a real one.

Ergot may be given at the same time, and in no case is it more beneficial. Cold enemata and cold drinks are also valuable auxilaries. If these fail, we may pour cold water from a height upon the abdomen, and the shock will generally succeed in rousing the uterus into action. Compression of the aorta is said to be effectual in some cases. It was introduced by Saxtorph, and has recently been recommended by MM. Sentin, Chailly, and others. Dr. Radford recommends galvanism. When all has failed, Dr. Gooch recommends the introduction of the hand into the uterus, for the purpose of exciting it to contract by the irritation. I have no doubt of its success, but it is so hazardous a practice that nothing would in my opinion justify it but the failure of all previous means.

The internal remedies advised in the other forms of hemorrhage (as lead and opium) are equally suitable to this, whether primary or secondary.

The restorative treatment is likewise the same.

665. I have met with two cases of hemorrhage after the expulsion of the placenta, arising from a cause which appears to be very rare, viz. the presence of a polypus in the uterus, preventing its due contraction. One case proved fatal within twenty-four hours; the other recovered under the ordinary treatment for hemorrhage.

If we knew of the presence of such a morbid growth, it would probably be better to remove it at once; but as yet the cases on record are too few to afford ground for safe conclusions.

CHAPTER XXI.

PARTURITION.—CLASS III. COMPLEX LABOUR.

ORDER 4. CONVULSIONS.

666. The next complication I shall notice is that affection of the nervous system termed convulsions; *i. e.* a convulsive seizure of the entire body and extremities; omitting those partial attacks mentioned by different authors, though they be of a convulsive or spasmodic nature. The complication is a very frightful and a very dangerous one, and may occur either during gestation, immediately before, during, or after parturition.

The variety of opinions and methods of treatment which have been put forth, seems mainly to have arisen from confounding the different species of convulsions; and in order to avoid this, I shall describe three varieties — the *hysteric*, the *epileptic*, and the *apoplectic* convulsion.

667. 1. Hysteric Convulsions. — This variety is confined to the period of gestation, and is more frequent during the early months than subsequently. Females of a nervous or hysterical constitution are the most obnoxious to the attack.

Causes. —Want of sleep, or excessive fatigue, may give rise to hysteric convulsions, or they may be caused by disordered digestion.

Symptoms.—The attack is generally preceded by a tightness about the throat, by sobbing, or repeated attempts at swallowing. The patient then becomes still and motionless, or may roll about from side to side. The hands are frequently pressed upon the breast, or carried to the neck, as though to remove some obstruction. The face is generally, though not always, pale, and not distorted; no froth issues from the mouth, nor are there the convulsive motions of the lower jaw, by which in epilepsy the tongue is sometimes severely bitten. In many cases the muscles of the back are violently contracted, which Dr. Dewees thinks a pathognomonic symptom. The patient is not insensible, though she cannot express her feelings or wishes.

After this state has continued for a longer or shorter time, the sobbing becomes more violent, or the patient screams and sheds tears, and the fit thus terminates. A great quantity of limpid urine is also discharged.

The paroxysm may be a single occurrence, or return after a time, with the same phenomena.

It does not generally influence the progress of gestation, though I have seen premature labour take place during the paroxysm.

The mother's health may be rendered rather more delicate, but it is not seriously compromised by the disorder.

668. Diagnosis. 1. *From epileptic convulsions.* — The body is but slightly contorted; there is not complete insensibility; there is no frothing at the mouth, nor biting the tongue, nor stertorous breathing, and after the

fit is over, the patient recovers her usual state — the reverse of all which symptoms occurs in epileptic convulsions.

2. *From apoplectic convulsions.*—In these the patient loses consciousness and voluntary motion at first, and ultimately all motion ceases. This is not the case in hysteric convulsions; besides which in the latter the breathing is not stertorous, and the patient soon recovers.

669. Treatment. — If the pulse be quick (which is not ordinarily the case), or the head ache, venæsection may be practised, or a few leeches applied to the forehead; but this is rarely necessary. In most cases, antispasmodics, combined with diffusible stimuli (valerian or assafœtida, with ammonia), will relieve the patient. Volatile alkali, held to the nostrils, is useful; or cold water dashed upon the face.

When the paroxysm is over, a moderate dose of opium may be given; and after a sound sleep, the patient will find herself nearly restored.

The stomach must be attended to. Tonics may be given if necessary, and aperient medicine.

670. 2. Epileptic Convulsions.—This variety is by far more frequent than either of the others.

671. Statistics. — *Frequency.*

Authors.	Total Number of Cases.	Convulsions.
Dr. Bland	1,897	2
Dr. Jos. Clarke	10,387	19
Dr. Merriman	2,947	5
Dr. Granville	640	1
Dr. Cusack	398	6
Dr. Maunsell	848	4
Dr. Collins	16,654	30
Dr. Beatty	399	1
Dr. Ashwell	1,266	3
Mr. Mantell	2,510	6
Dr. Churchill	600	2
Mad. Boivin	20,357	19
Mad. Lachapelle	38,000	61
Drs. Hardy and M'Clintock	6,634	13

Thus we have 172 cases of convulsion in 103,537 cases of labour; or 1 in about 602.

On the whole, the *mortality* is considerable, though probably much less so than formerly. Jacob states that in his time scarcely any survived. Dr. Parr, in his Med. Dictionary, that six or seven out of ten die. Dr. Hunter, that the greater proportion were lost.

Authors.	Cases of Convulsions.	Mothers Lost.
Mr. Giffard	4	2
Dr. Smellie	8	2
Mr. Perfect	14	5
Dr. Bland	2	0
Dr. John Clarke	19	6
Dr. Merriman	36	8
Dr. Ramsbotham	26	10
Dr. Maunsell	4	2
Dr. Collins	30	5
Dr. Beatty	1	0
Dr. Churchill	2	0
Mr. Mantell	6	2
Drs. M'Clintock and Hardy	13	3

Thus, out of 165 cases, 45 mothers were lost, or more than one-fourth.

Women of all temperaments may be attacked, but the sanguine are the more liable, especially those with short necks, and of short, square forms.

Dr. Ramsbotham has stated that "women with large families are equally, or perhaps more liable to be assailed." This, however, is not borne out by numerical investigation; for of 36 cases related by Dr. Merriman, 28 were with first children. Of Dr. Ramsbotham's, more than two-thirds were with first children; and of Dr. Collins' 30 cases, 29 were with first children.

672. Causes.—It is exceedingly difficult to state anything very definite as to the cause of epileptic convulsions. Doubtless they arise from irritation of the spinal system by some different and often distant organ; it may be the uterus, the stomach, the bowels or bladder.

Intemperance in eating or drinking may give rise to it.

Persons previously afflicted with convulsive affections seem predisposed to them at this time. Mental emotions and frights occasionally cause convulsions.

In some cases doubtless they are owing to the efforts made during the labour pains, by which an accumulation of blood takes place in the head.

Atmospheric influence appears to have some effect in determining the frequency of this disease. Most persons must have remarked how often a number of cases occur about the same time, as though depending upon the same general cause.

There is a curious case on record of convulsion commencing with conception, and recurring every fortnight during gestation.

673. Symptoms. — The symptoms in epileptic convulsions resemble very closely, if they are not identical with those of ordinary epilepsy. In the majority of cases there are certain premonitory symptoms. The patient, for some time previous, suffers from pain in the head, giddiness, confusion, ringing noise in the ears, obscure vision, temporary loss of sensation, rigors, nausea, or even vomiting. The face is flushed, and the eyes injected.

Dr. Hamilton, senior, mentions as peculiar, an intense pain in the fore-

head; and Dr. Denman, a severe pain in the stomach, and these he thinks the worst kind of cases. Osiander has noticed a tumid state of the hands and face preceding the attack. Dr. Lever, of London, has noticed the presence of albumen in the urine.

As the attack approaches, these symptoms are aggravated; the pupils become dilated, the face more injected, the eyes fixed, and the patient loses consciousness.

In some few cases, however, there are no precursory symptoms; the patient has no warning until the moment before she becomes insensible. The "aura epileptica" is seldom felt.

During the attack, the face is swollen, of a dark red or violet colour, and distorted by spasmodic contractions; the eyes are agitated, the tongue protruded, and the under jaw repeatedly closed with force, so as to wound the tongue. A quantity of froth is ejected from the mouth, which is generally drawn more to one side of the face than the other.

The muscles of the body are thrown into violent and irregular action; the limbs are jerked in all directions, and with such force that it is sometimes difficult to keep the patient in bed.

The respiration is at first irregular, and being forced through the closed teeth and the foam at the mouth, has a peculiar hissing sound; it subsequently becomes nearly suspended. The pulse is quick, and at the beginning full and hard, but afterwards small and almost imperceptible. The body participates in the purple colour of the face. The urine and fæces are often passed involuntarily.

This terrible paroxysm, however, is not of very long duration. After a period, varying from five minutes to half an hour, the convulsive movements become less violent, and gradually subside; the countenance is less distorted, and assumes a more natural and placid appearance, the eyelids close, the respiration becomes more regular, though still sibilant, and the circulation is restored, the pulse becoming more perceptible, though still very quick. The patient rests quietly in bed, and the paroxysm has terminated for the time.

During the interval, the patient's condition is very variable. She may partially recover consciousness, so as to recognise persons around her, and to be aware of something extraordinary having happened, without knowing what, and without being able to express herself clearly.

In other cases the return of intelligence (but without recollection) may be complete until the approach of the next fit, accompanied with great weakness, head-ache, and confusion. These are the more favourable cases.

Others again remain in a state of total insensibility, almost approaching to coma or asphyxia with sibilant or stertorous breathing, and without muscular motion, or with a restless throwing about of the body and extremities.

This calm is however of no very long duration; it may be half an hour, or two hours, but sooner or later the paroxysms return, to be succeeded by an interval which in its turn gives place to another paroxysm. I have known as many as eighteen paroxysms occur in twenty-four hours.

Dr. Lever, of London, has pointed out the presence of albumen in the urine of women attacked by convulsions. He states, "I have carefully examined the urine in every case of puerperal convulsions that has since

come under my notice, both in the lying-in charity of Guy's Hospital, and in private practice, and in every case but one the urine has been found to be albuminous at the time of the convulsions."—"I further have investigated the condition of the urine in upwards of fifty women, from whom the secretion has been drawn during labour by the catheter; great care being taken that none of the vaginal discharges were mixed with the fluid: and the result has been that in no cases have I detected albumen except in those in which there have been convulsions, or in which symptoms have presented themselves which are readily recognized as precursors of puerperal fits." This is most important, for in doubtful cases we have a test, which, together with the symptoms, may enable us by timely treatment to prevent so serious a complication.

The *termination* of the attack varies in different patients; some remain in a state of half stupor and great exhaustion for hours or days, and gradually recover.

In other cases the patient becomes maniacal, and may remain so for a long time, and ultimately recover. I had a patient who remained in a state of mental derangement for several months before she was restored.

In a few cases, the patient continues comatose, and gradually passes into a state resembling apoplexy, and dies.

674. I have already mentioned that convulsions may attack the patients either *during pregnancy*, at *the time of parturition*, or *after delivery*.

It will be necessary to say a few words upon the occurrence at each of these periods.

Pregnant women are more especially obnoxious to this disease during the two latter months of gestation, though it may occur at an earlier period, and at irregular intervals. The nearer the patient is to her confinement, the greater the risk of an attack, on account of the extreme distension of the uterus and its increased irritability.

Although the beginning of labour cannot be detected, either by an internal or external examination, at the outset of these attacks, yet during its continuance labour may commence, and run a natural course. In such a case, the fits will be found synchronous with the uterine contractions, though not recurring with each.

In many cases, however, the uterus remains perfectly quiescent, and gestation may be carried on for a time longer; it is rare, however, for the full term to be completed. In almost all cases the child is still-born, often putrid; but whether its death preceded the convulsions, or resulted from them, is not easily determined. When the former is the case, may we not attribute the convulsions to the dead child acting in some sort as a foreign body?

The labour runs a natural course generally, and in a fair proportion of cases the mother recovers tolerably well, though there are startling exceptions, as in the following case related by Dr. Blundell:

"A lady, in the end of her pregnancy, was seized with convulsions; her attendant was sent for, and decided that there were no indications of labour, and that a stay was unnecessary. The midwife left the house, and returning early the following morning, the patient was found dead; the child, too, the birth of which no one seems to have suspected, lay lifeless beneath the clothes."

When convulsions occur at the commencement of labour, it might

naturally be attributed, in some cases at least, to mal-presentation of the child, but this is not the case. Mal-presentation is observed very rarely in cases of convulsions.

675. *During labour*, the return of the paroxysm takes place at the commencement of a labour pain, although not with every pain. There is a greater expression of suffering from the uterine contraction than from the convulsion. The symptoms I have described apper to be more intense when the attack comes on during labour than during gestation.

The uterine contractions do not appear to be impeded by the fits; the labour generally runs a natural course in the usual time, if not terminated by art; neither is it necessarily fatal to the infant, although there is great danger.

It is remarkable, and not easily explicable, that after the convulsions have ceased, and the labour is over, there is a great tendency to abdominal inflammation, adding fearfully to the mother's risk. Denman, I believe, was the first to point out this fact, which Dr. Collins and others have confirmed: and which should be remembered in the treatment.

676. When the patient is attacked by convulsions *after delivery*, they generally occur from two to four hours after the birth of the child, sometimes later. There can be little hesitation in attributing them to some injury received by the brain or nervous system during labour, though we may not be able to specify the particular mischief. It does not however depend upon the length or difficulty of the labour; they occur as frequently after natural labour.

The loss of blood at the time of delivery does not necessarily prevent the occurrence of the fit, though it adds to the danger by the debility it occasions.

Dugès considers cases of convulsions after delivery to be more tractable than any others, whilst Dr. Ramsbotham states exactly the contrary. I should say that the cases where the convulsions occur during labour, and continue afterwards, are the least manageable; next to these the attacks during labour only; then, those after delivery; and lastly, the most favourable are those which occur during gestation.

After recovery from the consequences of the attack, the patient may enjoy her usual health, and her subsequent pregnancies do not appear to be very liable to similar attacks.

677. Pathology.—In the majority of cases a *post mortem* examination affords but little information. In many instances there is no deviation whatever from the healthy state of the brain.

Sometimes the vessels of the brain are turgid with blood, and in other cases there is a quantity of serum effused on the surface and base of the brain, or into the ventricles.

The heart is generally flaccid and empty, and the lungs of a pale colour. Some fluid is occasionally found in the pleura or pericardium.

Traces of inflammation have also been discovered in the peritoneum.

In an admirable chapter on this disease, Dr. Tyler Smith has, I think, thrown much light on its pathology. He has proved that convulsions are not excited by irritation of the cerebrum alone, but by the primary or secondary effects produced upon the spinal marrow, medulla oblongata, or tubercula quadrigemina. And therefore that the causes giving rise to convulsions may be either, 1, *Centric*, such as pressure on the medulla

oblongata from congestion, coagula, or serous effusion within the cranium, loss of blood, morbid elements in the blood; emotion. Or, 2, *Excentric*, acting on the extremities of the excitor nerves, as irritation of the incident spinal nerves of the uterus and uterine passages; irritation of the excitor nerves within the cranium; irritation of the incident spinal nerves of the rectum; irritation of the ovarian nerves; irritation of the gastric and intestinal branches of the pneumogastric nerve; irritation of the incident spinal nerves of the bladder: and as probable causes, irritation of the cutaneous nerves, of the nerves of the mammæ, and of the hepatic and renal branches of the pneumogastric. More than one of these causes may, of course, act at the same time.

678. Diagnosis. 1. *From hysteric convulsions.* — In the attack just described, there is a total loss of consciousness, great muscular action, frothing at the mouth, frequent recurrence of paroxysm, and incomplete restoration or total insensibility during the intervals. In hysteric convulsions, on the contrary, the patient scarcely loses consciousness, exhibits only moderate spasmodic action, has no frothing at the mouth, does not suffer from a frequent recurrence of the fits, and recovers shortly after each. The sobbing, sighing, weeping, and screaming of the hysteric convulsion are also peculiar to it.

2. *From apoplectic convulsions.* — In epileptic convulsions, the whole body is thrown into violent spasms, which are repeated, with intervals of quiescence, and often of partial return of sense. The breathing is rather sibilant than stertorous, and the muscles preserve their tone even during the intervals; — whereas in apoplectic convulsions, the spasmodic movements occur at the commencement, and are not repeated; sense and sensibility are totally lost, the breathing is stertorous, and the muscles lose all power, so that the arm when raised, and allowed to fall, does so like that of a person recently dead.*

679. Treatment. — At whatever time the attack takes place, the first thing to be done is to take away blood from the arm or temporal artery largely, and in a full stream. If the paroxysms continue, this may be repeated. Denman took 40 oz. and Blundell 70 oz. of blood from a patient under these circumstances. We are not to be deterred from a free use of the lancet, by the absence of immediate relief — the benefit is rather in the ultimate and early recovery of the patient, than in the immediate arrest of the paroxysms.

Another good effect from venæsection is the prevention of the abdominal inflammation, to which we have seen that the patient is exposed subsequently.

* Instances occur of convulsions happening at each succeeding pregnancy, and persisting until abortion takes place. It is then one of the greatest afflictions that can befall the married female. "I have witnessed," says Dr. Huston, in a note to a former edition, "the attack twice in the same lady, with only an interval of three months, both times terminating, as remarked, in abortion. She is a remarkably delicate woman, of great nervous impressibility. During the attacks she had no frothing at the mouth, nor stertorous breathing, and yet, after recovery, was unconscious of all that had passed. She was bled freely at the commencement of the first attack, because of pain in the head, and had a tedious recovery; the next time, she was treated by the use of excitants, as sinapisms, wine whey, camphor, morphia, &c., and recovered rapidly. The symptoms were very similar in both attacks;—as the more prominent of these subsided, the hysterical evidences, such as crying, laughing, &c., became more manifest." — Editor.

If there be any objection to repeating the venæsection, leeches may be applied; or if the patient be sufficiently quiet, the nape of the neck may be cupped.

A strong purgative (calomel and jalap for example) should next be administered, as from the free evacuation of the bowels great benefit is generally derived; and it may also excite uterine contractions, and hasten the delivery.

The head may then be shaved, and cold lotion or ice applied. Denman speaks highly of cold affusion. A warm bath has been recommended, but it would be very difficult to use it in many cases.

After the lapse of some time, the head and nape of the neck may be covered with blistering plaster, as counter-irritation will materially further the restoration of the patient.

When, after copious bleeding and purging, the attack is somewhat subsiding, it has been recommended to give an opiate. Considerable difference of opinion has existed upon this point, owing, I think, to the different parties not specifying with sufficient accuracy the time at which it should be administered, and the cases suitable for it. Under the circumstances I have mentioned, it seems to be the opinion of the highest authorities that it may be of service.

Dr. Collins remarks, "Many of our best writers have actually condemned the use of opium in convulsions, stating it to be most injurious—some even destructive. Ample experience has convinced me, that it is not only harmless, but *highly beneficial* in those cases where the fits *continue after delivery*. And I should hope the cases adduced will prove satisfactorily that it is also useful under many other circumstances, when proper steps had been previously taken. Its combination with tartar emetic, and occasionally with calomel, is most advantageous."

Calomel, given so as to affect the constitution, has been found beneficial. Dr. Collins speaks very highly of tartar emetic, in doses sufficient to produce nausea, but not vomiting. "In every severe case of convulsions, after having carried into effect the ordinary mode of treatment, as *bleeding freely*, *acting briskly* on the bowels, with calomel and jalap, and at the same time adopting the means usually had recourse to for protecting the patient during a paroxysm, I endeavoured to bring her under the influence of tartar emetic, so as to nauseate effectually, without vomiting. With this view, a table-spoonful of the following mixture was given every half hour:—

℞	Aquæ Pulegii,	℥ viii.	
	Tartar Emetici,	gr. viii.	
	Tinct. Opii,	gtt. xxx.	
	Syr. Simpl.	℥ ii.	M.

"In some cases the quantity of tartar emetic used was only four grains to an eight-ounce mixture; and in others, the quantity of opium was somewhat increased."*

* Anæsthesia has been resorted to as a means of controlling puerperal convulsions, by Messrs. Clifford, Wilson, Kite, Hearn, and Clifton, in England, by Chailly, in France, and by Dr. Channing and a number of other practitioners, in the United States. In nearly all the cases, the convulsive movements were entirely controlled or essentially modified upon the induction of anæsthesia. The great majority of the patients recovered. The facts that have been adduced in favour of this practice in, confessedly, one of the most fearful and dangerous complications of labour, press it strongly upon the attention of the practitioner.—Editor.

It will be necessary to insert a wedge of leather or wood between the teeth, to prevent injury to the tongue, and also to remove every thing out of the way, by striking against which, the patient might hurt herself.*

This treatment applies equally to convulsions occurring before, during, or after labour — except that in the latter case the quantity of blood taken must be modified according to the state of the patient.

680. The next important question is, WHETHER WE ARE TO INTERFERE WITH THE PROGRESS OF GESTATION OR PARTURITION.

I believe there is no dispute, that until labour sets in naturally, interference would be injurious; so that in convulsions during gestation, we have nothing to do with the uterus, but must confine ourselves to the treatment of the convulsive disease.

If the attack take place at the commencement of labour, some practitioners have been anxious to hasten the operations of nature by manual dilatation; but this has been abandoned, and very properly, as likely to increase the convulsions, without advancing the progress of the delivery. Belladonna has been applied to the cervix uteri, for the purpose of dilatation, but I should doubt its utility, and dread its poisonous effects. The older writers, with some moderns, have proposed incision of the cervix, but the risk would outbalance any benefit to be derived from so "heroic" a remedy.

But supposing the os uteri to be dilated or dilatable, are we then to proceed to deliver by art? This question has been much debated, and opposite opinions have been advocated. Some advise instant interference, and others no interference at all.

The true plan seems to be to avoid both extremes. We are not necessarily to interfere at this stage of the labour, beyond rupturing the membranes, which sometimes hastens the progress of the labour.

Version or turning, has been often recommended, but, from all the cases I have seen or collected, it would appear a most hazardous measure. Dr. Ramsbotham advises it, and yet the three cases he relates in which he practised it proved fatal. Five patients out of seven are generally lost. Dr. Collins is strongly opposed to it.

We may therefore conclude that version is not to be attempted.

But when the head has descended into the pelvis, so as to be within reach of the forceps, and there is sufficient space, it will be proper to apply that instrument, inasmuch as delivery, when it can be accomplished without injury, is very desirable.

The attempt must be made during an interval between the paroxysms, and should the introduction of the blades bring on a violent fit, it will be necessary to withdraw them, lest they should be forced through the vaginal or uterine parietes, during the struggles of the patient.

Should the head of the child be so fixed in the pelvis, as to defy all reasonable efforts with the forceps, it may be necessary to use the perforator; but, before doing this, the judicious practitioner will consider well the amount of benefit likely to be obtained, and the risk certainly incurred —recollecting that the child may be alive, that the labour may, if left to

* A roll of muslin or linen answers as well as leather, and much better than wood; besides, it is always to be obtained at the moment. — EDITOR.

nature, terminate favourably, and that even if delivered by art, the fits may not necessarily cease.

If we are satisfied that the child is dead, we should be justified in delivering by the perforator and crotchet at an earlier period of labour, provided that the os uteri be dilated or dilatable, or that the head have passed through it, and that the convulsions be so formidable as to require speedy delivery.

After the convulsions have ceased, Dr. Collins remarks, "Should the patient become maniacal, as is occasionally the result when the fits have been severe, and have continued for any length of time after delivery, all local distress, as pain in the head, or any symptom that would indicate abdominal complication, should be diligently looked after, and treated accordingly; as by so doing, keeping her fully under the influence of tartar emetic, at the same time acting well on the bowels, and excluding light from her room, as also all other external irritants, the best results may be expected. It is a great satisfaction to the friends of the patient in such a situation to be assured, that there is little liability to a return of this derangement of mind, as is the case in most other forms of mania."

681. 3. Apoplectic Convulsions. — This variety seldom or never occurs, except towards the termination or after the conclusion of labour. Dr. Burns indeed mentions its occurrence at the commencement of labour, and MM. Morithon and Menard at the sixth month of pregnancy.

Causes.—It is evidently caused by the stress upon the cerebral vessels during the labour pains.

It is very probable that anxiety of mind may predispose to the attack; at least in one case I saw, this appeared to be the case.

682. Symptoms. — In many cases, the patient suffers from pain and throbbing in the head for some days previously; but in others there are no premonitory symptoms.

Generally speaking, during the labour the patient complains of headache; and during the second stage, the face may be observed to be much flushed, and the eyes injected.

Strictly speaking, there is but little convulsion; the body and extremities are agitated or thrown about for a short time, and then the patient lies in a comatose state. There is little or no distortion of the face, and no frothing at the mouth. The muscles become flaccid and powerless; the respiration is stertorous; there is no return of intelligence, and rarely any repetition of the paroxysm, though such cases have been recorded.

In almost all cases the condition of the patient remains unaltered until death; but there are a few cases, answering, I presume, to the congestive apoplexy of Abercrombie and Lallemand, where our timely aid is successful, and the patient recovers sense and motion; and, if proper care be taken, is speedily well.

The pulse is full and slow, and the pupils in some cases dilated, in others contracted, but in all insensible to light.

I do not know that I can give a better illustration of this disease than by relating the two following cases. For the first I was indebted to my lamented friend, the late Dr. Aston; it appears to be a simple case of

apoplexy from congestion: the second occurred in the practice of a dispensary to which I was attached. I quote them from a report I published some years ago in the Medical Gazette: "Catherine Costello, æt. 18 years and 9 months, of low stature, and corpulent figure, complained first of severe head-ache on Wednesday, January 2, 1833. The pain was more violent than any of the kind she had ever experienced. Sickness of the stomach set in nearly at the same time, and she continued throwing up green bilious matter during the entire day; the bowels were confined for four days; the face and extremities were much swelled, which commenced two days before, and continued gradually to increase as the head-ache became more intense. She wanted about seven weeks to complete the usual term of utero-gestation. I (Dr. Aston) was sent for in the evening; she was walking about the room, but suffering most acutely; the face was swelled to such a degree as almost to hide the eyes, and her speech somewhat thick. The motion of the child had not been felt all day. As she had an objection to bleeding, I omitted it for the present, and directed some opening medicine to relieve the bowels; and having given the requisite directions, I left her; but in a few hours her husband came for me in all haste, requesting my immediate attendance, as she had a fit, and appeared to be in a dying state. Upon further inquiry, I was told that the pain in the head got much worse — when suddenly the eyes became fixed, the face distorted, convulsive motions ensued, and ended with stertor, which must have been of short continuance, as no such symptoms existed when I visited her a short time afterwards *although she was unconscious of anything that happened until after venæsection*, which I immediately performed to the extent of 18 or 19 oz., from which she experienced almost instantaneous relief. The heat of skin was much greater than natural; thirst extremely urgent; pulse pretty frequent, but inclined to hardness; after venæsection it became quicker; shortly after, slower and softer, until it gradually came down to the natural standard. From this time all the symptoms subsided, and she was delivered January 5th, and recovered well."

"Mary ——, æt. 30, was attended in her first confinement by a pupil of the Wellesley Dispensary, on Monday, November 20, 1832. The labour was natural, and terminated within the usual period. She complained of severe head-ache during the labour, and seemed sleepy towards the conclusion. After asking some questions of the attendants, she settled to sleep; some irregular motions of the limbs were noticed by those in the room, but nothing further, until her breathing became loud and heavy, when, as they could not rouse her, I was sent for. I found her perfectly insensible; pupils fixed and contracted; breathing stertorous; heat of head but little increased; abdomen distended with flatus; muscles perfectly flaccid; pulse firm, and tolerably full. The usual remedies were tried, but unsuccessfully, and she died during the night. A *post mortem* examination was permitted, and we found great effusion of blood, filling both ventricles. A quantity of serum also was found at the base of the skull.

"On further inquiry, I learned that she had been the victim of seduction and desertion, and that she had suffered from depression of spirits and severe head-aches for some weeks before her confinement."

683. Pathology. — The brain may be found greatly congested, but without any effusion; but this I believe to be rare.

There may be great effusion of serum, which by its pressure will cause symptoms of apoplexy.

More frequently, blood is poured out into the ventricles, into the substance of the brain, or at its base.

Cases of this kind have been noticed by Denman, Targioni, Marchais, Lachapelle, Leloutre, Schedel, Velpèau, &c.

684. Diagnosis.—The entire and persistent insensibility—the absence of repeated paroxysms with their accompanying symptoms, will at once enable us to distinguish apoplectic from epileptic or hysteric convulsions.

It is not easy to distinguish that form which arises from congestion from that caused by effusion — the chief difference being in the intensity of the symptoms.

685. Treatment.—The most active antiphlogistic measures should be instantly put in requisition; a large quantity of blood should be taken from the arm, jugular vein, or temporal artery, and repeated if necessary. This is the more requisite, as it is from the effect of blood-letting, that we are mainly to look for the distinction between apoplexy from congestion and apoplexy from effusion. If no relief whatever be afforded, the case may be regarded as nearly hopeless; but if the patient be at all benefited, the head should then be shaved, and ice applied.

After a short time, a large blister may be applied to the head or neck, and a brisk purgative given.

These remedies will generally afford relief in those cases which are susceptible of it, and they may be modified or repeated as circumstances may require.

Should this variety occur during labour, and the uterine action be suspended, it will be desirable to deliver the patient as speedily as possible, so as to save the child; and for this purpose, if the head be within reach, the long or short forceps should be applied.

CHAPTER XXII.

PARTURITION. — CLASS III. COMPLEX LABOUR.

ORDER 6. LACERATIONS.

686. Under this head I propose to treat of rupture of the uterus and vagina, vesico-vaginal and recto-vaginal fistula, and laceration of the perineum.

1. RUPTURE OF THE UTERUS. — This formidable and very fatal accident has long been known to practitioners in midwifery.

It is not, however, confined to the time of parturition, but may occur during gestation, or at a more advanced period of life.

687. STATISTICS. — The following table will indicate the frequency of its occurrence.

Authors.	Total No. of Cases.	Cases of Rupture.
Dr. Jos. Clarke	10,387	8
Dr. Merriman	2,947	1
Dr. M'Keever	8,600	20
Dr. Collins	16,654	34
M. Pacaud	4,180	2

Making a total of 65 cases in 42,768 patients, or about 1 in 657.

Dr. Burns says that it occurs about once in 940 cases.

It rarely occurs with first children.

Of Dr. Jos. Clarke's cases—
1 was the 2d pregnancy.
1 " 3d "
2 " 4th "
1 " 7th "
1 " 8th "
1 " 9th "

Of Dr. M'Keever's cases—
4 had 2 children.
5 " 3 "
4 " 6 "
2 " 7 "
2 " 8 "
1 " 9 "

Of Dr. Ramsbotham's cases—
2 were 2d pregnancies.
1 " 4th "
3 " 7th "

Of Dr. Collins' 34 cases—
7 were 1st pregnancies.
6 " 2d "
6 were 3d pregnancies.
2 " 4th "
2 " 5th "
5 " 6th "
1 " 8th "
1 " 9th "
2 " 10th "
2 " 11th "

Dr. Cathrall's case was a 1st pregnancy.

Dr. Sims's patient had had several children.

Dr. Hooper's case was the 4th pregnancy.
Mr. Kite's " " 2d "
Dr. Frizell's " " 7th "
Mr. Powell's " " 1st "

Mr. Birch's cases were the 3d and 4th pregnancies.

Mr. Partridge's case was the 7th pregnancy.

Thus, of 75 cases, 9 occurred in the 1st pregnancy; 14 in the 2d: 13 in the 3d; and 37 in the 4th, or subsequent pregnancies.

688. Causes.—Various causes may give rise to it, and it may happen at different periods—

1. *During gestation.* — The form of extra-uterine pregnancy which is called *interstitial fœtation* (§ 250) may give rise to it. The ovum, instead of passing direct from the fallopian tube into the uterine cavity, is retained in an interstice of the uterine fibres, where it grows, up to a certain point. As it increases, the outer portion of the uterine parietes becomes gradually thinner by absorption (as in the case of abscess), and at length gives way, and the fœtus is precipitated into the abdomen, converting the case into one of ventral fœtation.

It may also be the consequence of disease, as in Mr. Else's and Dr. Spark's cases: from softening, and from abscess in the walls, as related by Duparcque.

Any violent accident, such as a fall or a blow, may give rise to it.

It sometimes occurs without any assignable cause; the patient, perhaps, is awakened from sleep by it.

It has been attributed to irregular action of the uterine fibres.

689. 2. *During labour.* — *a.* If the uterus have been attacked by inflammation during pregnancy, its tissue may have been so much weakened or disorganized, that the violent contractions which take place during labour may rupture it, from the want of consentaneous action in the part affected, or from the pressure of some part of the child against it.

Steidele relates a case where rupture occurred in consequence of gangrene.

My friend, Dr. Murphy, has published an excellent paper illustrative of this cause of rupture, with cases where the uterus was atrophied, thinned, or softened in texture.

Duparcque quotes cases of thinning of the uterine walls, softening, scirrhus, and gangrene.

In some cases, the seat of the laceration corresponds exactly with the situation of the previous pain.

Dr. Tyler Smith believes that in many cases violent uterine action is in itself the cause of rupture; the immediate cause being either emotion or volition, or a reflex, or peristaltic action.

The period of labour at which the rupture may occur from this cause, will vary; it may be at the beginning, before the rupture of the membranes; during the passage of the head through the pelvis; or after the delivery.

b. A certain amount of narrowing of the upper outlet may give rise to it. This is a purely mechanical cause. The head of the child is forced downwards by violent labour pains, but is unable to enter the pelvis, from the contraction of the upper strait; now if the pains continue with great power, the head is turned to one side or the other, or posteriorly, and the only obstacle here being the uterine or vaginal parietes, the head is driven through them at the weakest part. They offer the less resistance, probably, from the woman having generally borne several children.

In one of Dr. Clarke's cases, the antero-posterior diameter of the upper outlet measured but 3 inches; in two others, $3\frac{1}{2}$.

In case 18 of Dr. Douglas, the pelvis measured but two inches antero-posteriorly; and in another case (20) there was a bony ridge on the top of the symphysis pubis, to which the rent corresponded.

In one of Dr. Ramsbotham's cases, the antero-posterior diameter was only 2 inches; in another 3 inches; and a third had always had difficult labours previously.

In one of Dr. Collins' cases, the same diameter measured $2\frac{1}{2}$ inches; and in several it appeared narrower than usual.

The sex of the child will contribute to the increase of this disproportion—male children having the larger heads. Now, of the 20 cases mentioned by Dr. M'Keever, 15 children were males, and 5 females; and of Dr. Collins' 34 cases, 23 were males.

It occurs at all ages; but the proportional frequency is greater above 30 years of age than previously.

Dr. Collins found—						Dr. Collins found—					
1 patient of the age of 16 years.						7 patients of the age of 30 years.					
1	"	"	"	21	"	2	"	"	"	32	"
1	"	"	"	24	"	1	"	"	"	33	"
3	"	"	"	25	"	1	"	"	"	34	"
2	"	"	"	26	"	3	"	"	"	35	"
1	"	"	"	27	"	5	"	"	"	36	"
3	"	"	"	28	"	1	"	"	"	37	"
1	"	"	"	29	"	1	"	"	"	40	"

c. The oblique position of the uterus has been assigned as a cause, from its directing the force of the child's head against the side of the cervix uteri and vagina.

d. Some one of the tissues of the uterus may give way previous to or during labour; perhaps from previous disease; perhaps from some peculiarity of structure; and in some cases, without any appreciable cause.

Sir Charles M. Clarke published a case, in which the peritoneal covering of the uterus alone was torn; and similar cases have been since recorded by Mr. Partridge, Mr. White, Dr. Ramsbotham, Mr. Chatto, and Dr. Davis. Dr. Collins has also met with a case of this kind.

Dr. Radford published two cases in which the muscular coat was torn, the serous membrane remaining uninjured. Dr. Ramsbotham met with a case nearly similar; and Dr. Collins met with nine such cases. Duparcque relates one, and Velpeau two.

Through the kindness of Mr. Custis, of Dublin, I assisted at the *post mortem* examination of a patient, who was attacked with symptoms of ruptured uterus; sudden pain in the abdomen, vomiting, collapse, &c., and who died in a few hours. We found no rupture in any part, but extensive effusion of blood beneath the peritoneum covering the uterus, and lining the iliac fossæ; the result, probably, of a ruptured blood-vessel. There were also twelve or fourteen ounces of sero-sanguineous fluid in the peritoneal cavity. A case very similar is related by Dr. Ramsbotham.

Though the extent of mischief is less in these cases, yet they are equally fatal.

e. Violence in turning the child may rupture the uterus, and it may accompany this operation, in certain states of the cervix, without any fault of the operator.

f. Rigidity of the os uteri, or imperforation, may occasion laceration.

g. There are several cases on record where the os uteri has been torn completely off during labour. Steidele, and Mr. Scott of Norwich, have each recorded one, and three others occurred in Dublin within a short

time of each other. It appears to be the result of pressure at the brim of the pelvis, rendering the texture of the cervix soft, and easily torn.

Among the *direct causes* are enumerated blows, falls, anger, convulsions, excessive movements of the child, over-distension, &c.

In one case, M. Malgaigne attributed it to the mal-administration of ergot of rye.

690. 3. *At an advanced period of life.* The structure of the cervix uteri is much changed in old age; it becomes close and dense, resembling cartilage, and the canal through it is always reduced in size, and sometimes obliterated. When the outlet for the escape of the uterine mucus is thus closed, it accumulates; and if the quantity be sufficient to distend the cavity, a process of thinning or absorption commences in some part of the walls of the uterus, and proceeds until an opening is made into the peritoneal sac.

The same process will take place with any other fluid thus deprived of exit. Duparcque quotes two cases of the kind.

691. Pathology. — If the laceration be the result of disease, it may take place at any part of the organ, the body, fundus, or cervix; and it will generally be found to correspond to the situation of the pain felt by the patient previously. The edges of the rent exhibit marks of disease, the tissue is thinned, softened, and pulpy, breaking down easily under the finger.

The colour may be changed to a deep red, or brown colour, and occasionally the odour is offensive.

When the laceration is the result of mechanical causes, it generally takes place near the cervix, and involves both the uterus and vagina. It may run along the anterior or posterior surface of the uterus, or at one side. In six of Dr. Jos. Clarke's cases, it was on the anterior surface, and in one, posteriorly. In Dr. Sims' and Hooper's cases, it was anteriorly; in Mr. Birch's posteriorly; and in Mr. Cathrall's case, on the right side. In three of Dr. Ramsbotham's cases, it was posteriorly; in one along the right side; and in another along the left. Of 23 cases, Dr. Collins found one on the right, and one on the left side—eleven posteriorly, and ten anteriorly.

The direction of the rent may be nearly perpendicular, or inclining to one or other side, or running transversely.

In these cases the structure of the uterus is scarcely altered; its texture is firm, and its colour natural, except where the blood is ecchymosed.

The edges of the rent are jagged and uneven.

Occasionally, but very rarely, the bladder has also been torn.

When the serous membrane alone is injured, we find numerous small incisions, resembling scarifications, from a quarter to half an inch in length, and one or two lines in depth, or a smaller number of larger lacerations.

They are almost always curved, with the convex part towards the fundus, and may be situated on the anterior or posterior wall of the organ.

In all the cases hitherto mentioned, more or less blood is found effused in the peritoneal sac, and in many, the usual products of peritonitis.

When the muscular structure alone is injured, it may present either a simple solution of continuity, or evidences of disease. Blood may be

found in the cavity of the uterus, and the serous membrane may become inflamed with the usual results.

The cervix uteri, when separated, has generally a bruised appearance; is swollen, and of a red colour. The edges are ragged and uneven. The canal of the vagina is rendered continuous with that of the uterus, but the connexion between them is not compromised.

When the uterus of an old person is ruptured, from the cause assigned, we shall discover a perforation in some part of it, with a considerable thinning of the walls around it.

In all these cases, with the exception of those in which the os uteri is torn off, or the muscular structure alone injured, we find marks of extensive peritonitis, unless the patient die of the shock.

692. Symptoms.—These vary very slightly, whether the uterus be torn completely through, or whether the peritoneal or muscular tissues alone be injured.

Certain authors have pointed out what they deem premonitory symptoms; but these are exceedingly ambiguous. The circumstances which may justly excite our fears are, previous difficult labours, the occurrence of partial hysteritis during gestation; and during labour, the coincidence of violent labour pains with a narrow pelvis.

Rupture of the uterus and vagina is marked by a sudden, acute, and intolerable pain like a cramp; a sense of some part bursting, giving way, or tearing, with an audible noise according to the testimony of some patients; the suspension of the labour pains; hemorrhage from the vagina; and a rapidly succeeding state of collapse.

Of these symptoms, the excruciating pain and the collapse are the most constant, as in some cases the bursting or tearing is not felt; and when only one tissue suffers, the labour may continue, and there may be no hemorrhage.

The pain continues, with little or no intermission. The stomach is disturbed, and vomiting ensues, at first, of the contents of the stomach, then of a greenish, and ultimately of a black matter, the "coffee-ground vomit."

The countenance is pale and ghastly, with an expression of intense suffering and and anxiety; the surface is cold and clammy.

The pulse is very rapid, small, feeble, and fluttering; the respiration hurried and difficult; and the patient requires to be raised in bed.

There is almost always a discharge of blood from the vagina; sometimes slight, and at others so considerable as to cause death.

We know, also, from *post mortem* examination, that in most cases, hemorrhage takes place into the abdominal cavity; and some authors have attributed the state of collapse to this cause; but though it may aggravate the collapse, we know that this is present when there is no internal hemorrhage.

When the rupture is complete, the expulsive efforts cease, because the child escapes partially or wholly from the cavity of the uterus, into the abdominal cavity, where it may be felt by the hand through the abdominal parietes.

The presentation, which was probably within reach before the accident, cannot now be ascertained by the finger.

When the rupture is complete, a loop of intestine may escape through

it, and give rise to the symptoms of strangulated hernia. Duparcque quotes three cases of this kind from Remigius, Percy, and Beauregard.

A case is related by Dr. M'Keever, where a yard and a half of intestine became strangulated, and sloughed off.

This state of collapse may continue for some time, if it do not prove immediately fatal: but at length a certain amount of reaction takes place; inflammation sets in, and the patient exhibits all the symptoms of peritonitis—acute pain, exquisite tenderness of the abdomen on pressure, tympanites, decubitis on the back, with the knees drawn up, quick, small, hard pulse, hurried respiration, &c., &c.

693. Terminations.—The patient may die of the shock a few minutes or hours after the accident, or after delivery; or she may survive the shock, and die of the peritonitis; or lastly, she may be carried off by secondary diseases, as sub-peritoneal, or lumbar abscess, &c.

Of Dr. Jos. Clarke's patients—	Of Dr. Collins' cases—
1 died undelivered.	2 women died in 14 hours after delivery.
1 " in 4 hours.	1 " 17 " "
1 " 20 "	1 " 24 " "
2 " 24 "	1 " 25 " "
1 " 30 "	1 " 30 " "
Of Dr. Ramsbotham's—	4 " on the 2d day "
3 died shortly after delivery.	1 " 3d " "
2 in 1 hour "	4 " 4th " "
1 " 3 days "	1 " 5th " "
Of Dr. Collins' cases—	2 " 8th " "
4 women died immediately after delivery.	1 " 9th " "
1 " in 2 hours "	1 " 11th " "
3 " 4 " "	1 " 14th " "
1 " 10 " "	1 " 24th " "

In a case under my care the patient died in five minutes undelivered.

In by far the greater number of cases, the accident proves fatal.

Of Dr. Smellie's	3 cases,	2 died.	Of Dr. Collins'	34 cases,	32 died.
Dr. Jos. Clarke's	8 "	7 "	Dr. Beatty's	1 "	1 "
Dr. Merriman's	1 "	1 "	Drs. M'Clintock and Hardy's	9 "	9 "
Dr. M'Keever's	11 "	9 "			
Dr. Ramsbotham's	13 "	10 "			

Some cases, however, are on record where the patient recovered. Heister relates a case mentioned to him by Rungius; and Spiering, one cured by Forquosa. M. Peu,[a] Dr. Hamilton,[b] Dr. James Hamilton,[c] Dr. Jos. Clarke,[d] Dr. Douglas,[e] Dr. Labatt,[f] Dr. Frizell,[g] Mr. Ross,[h] Mr. Kite,[i] Mr. Powell,[k] Mr. Birch,[l] Mr. Smith,[m] Mr. MacIntyre,[n] Dr. Hendrie,[o] Mr. Brook,[p] Dr. Davis,[q] have each recorded one case of cure.

Dr. M'Keever, and Dr. Collins, have each related two, and Dr. Ramsbotham three cases. Duparcque has collected four from French authorities.

[a] Pratique des Accouchemens, p. 341.
[b] Outlines of Midwifery.
[c] Select Cases in Midwifery, p. 138.
[d] Trans. of Association, vol. i.
[e] Essay on Ruptures of the Uterus, p. 7.
[f] Dublin Med. Essays, p. 343.
[g] Trans. of Association, vol. ii. p. 15.
[h] Annals of Medicine, vol. iii. p. 377.
[i] Mem. of Med. Soc., vol. iv. p. 253.
[k] Med. Chir. Trans., vol. xii. p. 537.
[l] Ibid., vol. xiii. p. 357.
[m] Ibid., vol. xiii. p. 373.
[n] Med. Gazette, vol. vii. p. 9.
[o] American Jour. of Med. Science, vol. vi. p. 351.
[p] Med. Gazette, Jan. 17, 1829.
[q] Obstetric Medicine, vol. ii. p. 1070.

Osiander states that he has known several cases of recovery.

Velpeau quotes several cases.

There are a very few instances on record where the patient has recovered, although the fœtus remained in the peritoneal cavity.

In cases of interstitial fœtation, also, the patient has sometimes survived both shock and inflammation.

694. Diagnosis. — The sudden acute pain; the cessation of labour; the collapse; and the recession of the child, will render it easy to recognise the case.

But when the rupture is partial, it may be more difficult; and we must rely mainly upon the sudden pain and the collapse for our diagnosis. The occurrence of peritonitis subsequently, will serve to clear up the difficulty.

In a very able paper in the "Dublin Journal," Dr. M'Clintock has shown that the life or death of the child is a most valuable diagnostic sign. In cases of laceration the child dies almost immediately.

The sudden occurrence of peritonitis in old women, may excite a suspicion of its origin; but it will not be easy to arrive at certainty.

Prognosis.—From the details already given, it is almost unnecessary to state, that the prognosis is always grave. So very few are saved that there is but a faint hope of the recovery of the patient.

695. Treatment. — The first question which presents itself, when a rupture of the uterus is recognized, is, "*shall the patient be delivered at once, or left to nature?*" When the os uteri is undilated, instant delivery may be impossible: but in all cases where it is possible, the testimony of experience is in favour of immediate delivery.

And the cases of recovery confirm this decision; for in all but one or two, the women were delivered.

Dr. W. Hunter and Dr. Garthshore advised that the case should be left to nature; and subsequent to the publication of his Introduction to Midwifery, Dr. Denman came to the same conclusion. The evidence of facts, however, must be allowed to counterbalance even such illustrious names; and that evidence is unquestionably in favour of delivery.

The *mode* of delivery will depend altogether upon the circumstances of the case.

1. If the head have not receded, and be within reach, or be already in the pelvis, it will be well to deliver with the forceps if possible; but if not, we must have recourse to the perforator.

2. If the child have escaped into the cavity of the abdomen, the hand must be introduced into the vagina, and, if practicable, passed through the laceration, and the feet seized and brought down, so that the child may be extracted through the rent.

The placenta is then to be removed, the vagina cleansed, &c. In all these cases the child is born dead.

3. If the uterus have contracted very firmly, it may be impossible to pass the hand through the rent; or the pelvis may be too narrow to admit of the child being extracted footling, or even of the passage of the hand.

4. In such cases we are advised to perform the Cæsarean section, and extract the child and secundines through the abdominal parietes.

Successful cases are related by Thibault des Bois, Lassus, Haden, Baudelocque, Latouche and Jopel, Lambron, Glodat, &c.

To these may be added cases related by the following:—MM. Coquin,[a] Sommer,[b] Ceconi,[c] Ruth,[d] Rust,[e] Gais, Naegelè, Weinhardt,[f] Heim,[g] Busch, Demay,[h] Lechaptois et Lair,[i] Velpeau.[k]

5. This will be the only mode of delivery, in ruptures occurring during gestation, before the labour has commenced.*

During the stage of collapse, it may be necessary to give stimulants, ammonia, camphor, musk, wine, &c.; but this should be done with great judgment, so as just to attain our object, and no more; bearing in mind that whilst we may be relieving the collapse, we may be aggravating the reaction, and increasing the danger at that period.

A large dose of opium may be given after the delivery.

When inflammation sets in, of course the treatment must be actively antiphlogistic. Three or four dozen leeches should be applied over the abdomen, and repeated if necessary.

[a] Bulletin de la Faculté, 1812, p. 86.
[b] Ibid.
[c] Bulletin de Ferussac, vol. v. p. 47.
[d] Ibid., vol. vi. p. 280.
[e] Luroth, Ibid., vol. xix. p. 85.
[f] Ibid.
[g] Ibid.
[h] Journal Gén., vol. v. p. 58.
[i] Ibid., vol. i. p. 187.
[k] Traité d'Accouch., p. 355.

* "In regard to the point of duty in the management of such cases (of ruptured uterus), I have to remark," says Dr. Meigs (*op. citat.*), "that, upon discovering even the smallest commencement of a laceration of the vagina or cervix uteri, the earliest practicable precautions should be taken to ensure delivery *per vias naturales*, and the prevention of the escape of the child into the peritoneal sac. This should be done, where it is practicable and convenient, by seizing the head, if it be the head, in the grasp of the obstetrical forceps; by bringing down the feet, if it be a breech; by turning and delivering, if it be a shoulder case; or by turning to deliver, if it be a case of face presentation, or departure of the chin, or any condition indeed in which the operation of version would be most likely to rescue the woman from the dangers by which she is surrounded.

"Should the laceration have permitted the child to escape at once into the peritoneal sac, let the attendant lose no time, but bare his arm, and resolutely, with his hand passed through the rent, explore the abdomen in search of the feet, which he should immediately withdraw through the opening of laceration. But if this be not done; if some hours should have elapsed subsequent to the occurrence of the accident; if the woman be already much exhausted by hemorrhage, by constitutional shock and irritation, the question will arise as to the properest manner of fulfilling the indication, which must ever be to extract the child. The hemorrhage will now have been stayed: were it not so, the woman would be already dead: to pass the hand through the rent, should it be in the vagina, would be to set the hemorrhage again on foot. It will be always impossible to pass the hand through the rent in the uterus, because the uterus, being now contracted, will have reduced the size of the rent in proportion to the condensation of the organ. The child can never be returned through a contracted rent, having passed through it while the uterus was yet undiminished in size. I say, then, the question arises as to the mode in which the indication is to be carried out.

"I am firmly convinced, that, should I be called this day to the conduct of such a case, I should feel bound by my conscience to recommend a delivery by a gastrotomy operation. I cannot think that a clean incised wound along the linea alba, sufficient in length to permit the extraction of the child from the peritoneal sac, however exceptionable in itself merely considered, can be held in the least degree objectionable when compared with the delay, the fatigue, the contusion and the renewal of the suspended hemorrhage, that would inevitably attend an attempt to extract *per vias naturales*."

For much valuable information in relation to the subject of rupture of the uterus, the reader is referred to the excellent monograph of Dr. James D. Trash, of Brooklyn, N. Y., contained in the January and April (1848) numbers of the *American Journal of the Med. Sciences*. — Editor.

Large bran poultices are useful, and hip baths are recommended. Calomel and opium, or opium alone, are the most valuable remedies we possess. It should be given in large doses, or in smaller ones more frequently, so as to influence the system rapidly.

If the rupture have arisen from the narrowness of the upper outlet of the pelvis, and the patient recover, and again become pregnant, premature labour should be induced, at such a period of gestation as will allow the fœtus to pass without difficulty. It is of course desirable that the operation should, if possible, be deferred until the fœtus is "viable:" but I do not think this a "sine quâ non," as it may be worth while sacrificing the child to save the mother. Dr. Collins relates a successful case of this kind, in which the patient was delivered the first time after the rupture by artificial premature labour, and afterwards naturally. In Dr. Douglass' case, the patient was delivered by turning, the first pregnancy after the accident, and naturally the second.

It would, however, be much wiser for the patient to avoid the risk of a subsequent delivery.

696. II. Vesico-vaginal and Recto-vaginal Fistula.—Perforation of the coats of the vagina, anteriorly or posteriorly, with the subjacent organs, the bladder or rectum, is not very rare, and it is one of the most distressing and intolerable accidents to which females are subject; and the more so, as a cure is but seldom effected.

Indeed vesico-vaginal fistula has long been considered as one of the *opprobria* of surgery; and, with some exceptions, of late years the cure has been given up as hopeless.

Vesico-vaginal fistulæ are more frequent than perforation of the rectum; they are generally found separately, but in some cases co-exist.

A case was received into the Meath Hospital some years ago, in which the bladder and rectum were both perforated, the perineum lacerated, the canal of the vagina distorted by cicatrices, and closed at its upper part by adhesions.

Strictly speaking, we can hardly consider this form of laceration a complication of labour; it is rather one of its sequelæ, except in those unfortunate cases where injury is inflicted during extraction of the child, or the urine is allowed so to accumulate as to expose the bladder to rupture from the pressure of the child's head.

697. Causes. — Various *causes* may give rise to these accidents:

1. Either wall of the vagina may be wounded, accidentally or on purpose, by cutting instruments. Such has been the result of criminal attemps to procure abortion. In these cases, however, a cure often takes place spontaneously.

2. The long retention of a pessary in the vagina may give rise to inflammation and ulceration of the vaginal tunics, and ultimately to perforation of the bladder or rectum. This, however, but seldom occurs, and then only in aged females, for whom little can be done in the way of cure.

3. In powerless or difficult labours, where the head of the child is long retained in the pelvis, or where, by its size, it makes great pressure, the vagina may be the seat of inflammation, ulceration, and perforation, involving either of the subjacent organs, but much more frequently the bladder.

In these cases, the vagina is frequently narrowed, or deformed by irregular, circular, or spiral cicatrices, rendering the detection of the fistula somewhat difficult.

4. A maladroit use of instruments may occasion this injury. Cases of both kinds of fistula could easily be adduced from authors, as the result of carelessness or incompetence in the operator.

5. Retention of urine during labour will generally involve more or less pressure upon the bladder; if within certain limits, perforation will be the result of subsequent inflammation; if the distension be excessive, and the bladder protrude into the pelvis, so as to be pushed before it by the descending head of the infant, then, most probably, rupture of the bladder and vagina will take place.

6. The bladder is occasionally lacerated in rupture of the uterus, though there may not necessarily be a perforation of the vagina.

7. In corroding ulcer and cancer of the uterus, the ulceration may involve either or both walls of the uterus, and perforate the bladder or rectum, or both. For these cases, however, nothing curative can be attempted.

698. The *situation* of the perforation is of great importance in the cure of vesico-vaginal fistulæ. It may be at the junction of the urethra with the bladder—in the neck of the bladder—or in some part of its body. The opening may be more or less circular in form, or it may be a rent running longitudinally from before backwards, or transversely.

The curability of the fistula will depend, in a great degree, upon its being attended with a loss of substance or not.

Recto-vaginal fistulæ are uncertain in situation and form, occupying any point of the intermediate septum, and running antero-posteriorly or transversely.

699. Symptoms.—These depend primarily upon the cause of the fistula, and will vary according to it; and *secondarily*, upon the escape of the contents of the wounded organ. Whichever organ be wounded, the result is inexpressible distress to the patient. The escape of fæces or urine is attended with so marked and irrepressible an odour, that the patient is placed "*hors de société.*" Obliged to confine herself to her own room, she finds herself an object of disgust to her dearest friends, and even to her attendants. She lives the life of a recluse, without the comforts of it, or even the consolation of its being voluntary. It is scarcely possible to conceive an object more loudly calling for our pity, and strenuous exertions to mitigate, if not remove, the evils of her melancholy condition.

In addition to the offensive smell, the escape of the urine gives rise to excoriation of the vagina, external parts, and thighs.

The flow of urine is constant when the neck of the bladder is the seat of the injury, and at intervals when the wound is situated more posteriorly.

In all cases a careful examination should be made, by passing a catheter into the bladder, and a finger into the vagina; then placing the points of both in apposition, the whole posterior surface of the bladder should be passed over, and carefully examined. At some one point the finger and catheter will come in contact: the catheter may then be passed into the vagina, and the extent of the damage ascertained.

The same process will detect any injury of the recto-vaginal septum.

When the vagina is not cicatrised, it is not generally difficult to obtain the information we desire; but when deformed by cicatrices, it will require both care and patience.

It may sometimes be necessary to use the speculum.

In the majority of cases, little is to be hoped for from the efforts of nature; the borders of the wound become thickened and callous, and the case remains stationary during the patient's life.

In some few cases, however, the result is more favourable; as, for instance, when the wound has been inflicted by a sharp instrument.

In two cases under my care, where the wound was precisely at the insertion of the urethra into the bladder, and was followed at first by absolute incontinence of urine, a cure was obtained naturally. The wound slightly contracted, without healing, and the muscular fibres of the bladder assumed the office of a sphincter muscle, and closed the orifice, so that the patient could retain urine almost as long as previous to the accident, and could evacuate it at pleasure.

700. Treatment.—We cannot wonder that many methods should have been tried to remedy so offensive an accident, nor that so few should have succeeded, when we recollect the obstacle presented by the constant passage of urine or fæces. We shall first treat of the cure of—

I. Vesico-vaginal Fistula, which is by far the most difficult.

The probability of relief depends partly upon the situation, and partly upon the character of the fistula. When it is far back in the posterior wall of the bladder, and when there has been much loss of substance, a cure is seldom obtained; but when near the neck, we may sometimes succeed.

I shall now notice the principal plans which have been proposed.

1. *Dessault's method*, as it has been called, consisted in maintaining a catheter constantly in the urethra, so as to afford an outlet for the urine, and at the same time preventing its escape, by plugging the vagina.

J. Cloquet has added a kind of syphon to the catheter.

Chopart succeeded in curing a case by this means, where the wound was in the neck; but he failed in one where it was in the body of the viscus.

Peu, S. Cooper, and Blundell, each relate a case of cure.

There is no doubt that much relief may occasionally be derived from this plan. I had a case in which the patient was ultimately enabled to retain her urine for two hours, without dribbling, though the wound did not entirely close; but in some of the cases on record the wound completely healed.

There is this objection to the plan, however, that in many instances the patients cannot bear the catheter above an hour at a time. I saw two examples lately, where this circumstance proved a serious obstacle to the cure.

701. 2. *Cauterisation.*—This is obtained by the repeated application of the nitrate of silver or the strong acids. Dupuytren, who, I think, first proposed the plan, used the "nitrate acide de mercure," or nitrate of silver.

Relief has occasionally been afforded by this means, but a cure is very

rarely, if ever, effected. Where there is much loss of substance, it affords no chance. I have seen it fail more than once.

However, Dupuytren, and Delpech, and Baravero, are said to have thus cured several cases.

The best mode of applying the caustic is by means of a fenestrated speculum, which will leave the upper surface of the vaginal canal exposed, or by Lallemand's "porte caustique." The caustic should be lightly applied, as the object is not to produce a slough, but merely a contraction.

702. 3. *Actual Cautery.* — If the loss of substance be slight, and the wound small, there is no doubt that a cure may be obtained by this means. Dupuytren, who first proposed it, cured several; Dr. M'Dowell, one; Dr. Kennedy, two; Mr. Liston, four or five; and others have been equally successful. Dr. Colles has tried it successfully where the orifice was not too large, but without benefit where the fistula was extensive. I witnessed a successful case treated by my friend, Mr. Ferral, of St. Vincent's Hospital.

I also tried it in a case under my own care, but it failed, as I anticipated, on account of the large size of the opening.

The facility with which the operation is performed, will depend upon the situation of the fistula being more or less anterior.

The patient may be placed upon her back as for lithotomy, or upon her knees and elbows. Dr. Kennedy adopted the former; but I have found the latter far more convenient, and I think less offensive to the patient's feelings. The light can reach the part more readily, and the position of the operator is more convenient. The patient must be placed before a window, or a candle must be used.

The next point is to dilate the vagina, so as to ensure access to the wound, without contact with the vagina. This may be done by three brazen spatulæ, sufficiently long to reach beyond the rent, and broad enough to protect the vagina—or by a double-bladed speculum.

I have also used, with great facility and safety, a metal cylinder, closed at its extremity, but with an opening in the side, a little distance from the end, and corresponding to the fistula.

A catheter should be passed into the bladder, and through the fistula, to guide the operator, and to keep the mucous membrane of the bladder from protruding.

Having these preliminaries adjusted, the cauterising iron, at a white heat, should be *lightly* applied around the *edges* of the wound, and withdrawn.

The dilators, or speculum, may then be removed, and the patient placed in bed. If it do not occasion irritation, it will be advantageous to allow the catheter to remain in the bladder.

The patient should be kept quiet, and the bowels freed by medicine.

A certain amount of local irritation generally succeeds, which subsides in the course of a few days; after which the operation may be repeated as often as necessary.

The operation should not produce a slough, or the patient will not be benefited, but merely a corrugation or shrivelling of the edges. If we thus reduce the wound, so as to bring the edges in contact, adhesion may then take place, and the patient be cured. But it must in candour be

confessed, that whilst it is not difficult or uncommon to benefit the patient to a great extent, a complete closure of the fistula is very rare.

703. 4. The *Suture.*—This method is said to have been invented by Roonhuysen; at all events, it has been long known and practised by the profession, with varying results.

Of late years, it has been performed with success by Dieffenbach, Blandin, Chanam, and Jobert (who operated seven times, and cured three patients); Sanson, who failed; Deyber, who nearly, if not quite, cured his patient; Malagodi of Bologna, who has published his successful case; by MM. Lallemand, Dugès, and Roux, who failed; and by M. Naegelè.

Mr. Earle cured three cases by this means. Mr. Hobart, of Cork, formerly published a successful case in a London journal, and now states that he has since perfectly cured at least ten by the suture. A successful case is related in the American Medical Recorder.

Dr. Evory Kennedy has succeeded in diminishing the orifice several times; and in one case in which the twisted suture was used, the cure was complete.

Mr. Hayward, of Boston, U. S., has recently published a very interesting case, which was perfectly successful.

On the other hand, Dr. Colles, of Dublin, (whose name alone is a sufficient guarantee for all that science, and skill, and care could do,) has allowed me to state that he has repeatedly tried the common interrupted suture; but though he has by this means lessened the orifice, he has never succeeded in closing it entirely: and this was the result under very favourable circumstances.

He has also seen very unpleasant consequences result from the operation; hemorrhage (the edges of the fistula having been removed by the knife) to a great amount; fever, hectic, &c.

I have seen the operation performed very carefully twice; but in neither instance did union take place.

The operation may be performed in the following manner. The edges of the wound are to be renewed, either by paring with a knife, or the application of caustic; the latter has the advantage of being less liable to occasion subsequent hemorrhage. When this is accomplished, the patient is to be placed on her back or knees, and the vagina to be dilated. If the wound be near the insertion of the urethra, or can be brought down by passing a catheter through it, a curved needle (rather shorter than usual) may easily be passed through the opposite edges. If the wound be further back, an instrument must be used to pass the suture. Mr. Hobart fixed a curved needle at the end of a canula, by means of a piece of wire with a hook at the end of it, running through the canula. The needle is passed through the hook, and held firm by it.

M. Naegelè has contrived a needle, with a long handle, for passing the ligature.

He has also invented a species of scissors, for the purpose of paring the edges.

Mr. Beaumont has described an ingenious instrument for passing the sutures:—

"The instrument is in the form of a forceps, one blade of which is a needle, curved towards its point, close to which is its eye. The other

blade is broader on its opposing surface, less curved, and at its extremity has a hole through which the needle-point, and just the loop of the ligature, are carried when the blades are closed. On the back of the broad blade is a spring which, when pushed forwards, the blades being previously closed, catches the ligature on its point, and holds it.

"In using this instrument, the operator has only to seize in its points, in the same manner as he would with a pair of forceps, the border of the fistulous opening; the blades should then be closed, and the ligature will be carried through one lip of the aperture. The opposite border is then to be seized, and the blades to be closed, and held so. The spring on the back of the broad blade is now to be pushed forwards, by which the ligature is caught, and held at its point. The blades are then to be opened, and gently withdrawn, leaving a double ligature passed through opposite points of the fistulous aperture, so that a common or quilled suture may afterwards be formed.

Mr. B. used it once with a quilled suture.

The instruments I have used were chiefly copied from some lent me by Dr. Kennedy, with the addition of one I had made for transverse lacerations. They consist of an instrument for paring the edges of the fistula, a needle for a fissure running antero-posteriorly, a needle for transverse fissures, and of a hook for disengaging the ligature, after it has been passed through the edges of the wound.

When the twisted suture is used, short curved needles may be employed; it will also be well to keep them in for some time. In Dr. Kennedy's case they were retained about three weeks.

Many other modifications of the manner of applying the ligature (such as Schreger's, Ehrmann's, &c.) might be enumerated, but for them I must refer my readers to Kilian's work already mentioned.

It will generally be necessary to pass three sutures, none of which should be tightened till all are inserted, and when tied, the ends should be cut off. The tightening is easily accomplished with two pair of dressing forceps.

When this is done, the dilator, or speculum, may be removed and the patient put to bed.

There is considerable soreness and pain complained of, which may be relieved by vaginal injections of warm water twice a day, and the exhibition of purgative medicine.

When the edges of the wound have been pared, we must be on the watch against hemorrhage. Should it occur, cold injections may be thrown up, or a plug inserted, and if necessary, the sutures divided.

The sutures generally come away about the eighth or tenth day, and we are then able to ascertain the result of our operation, which, if not wholly successful, may be repeated after a week's interval.

In the majority of cases, I fear we shall find but little benefit; though even less success than has as yet attended our efforts, would justify the operation.

M. Naegelè has described an instrument, consisting of two small plates, joined at the back like the pages of a book, and fixed in a handle of steel. The anterior edges are brought together by a screw fixed in the handle, and the edges of the wound being included, are retained in apposition, and the lower part of the handle removed.

M. Lallemand has also invented one, which he calls a "sondeeigne," by which a similar effect is produced.

Not having seen the instrument, I am unable to give a description of it.

He has cured one case with it, partially cured another, but failed twice.

MM. Langier and Lewiski have also contrived similar instruments.

704. 5. Dr. Blundell saw a fistula in the neck of the bladder, near the urethra, cured by laying open the urethra to the rent, and then healing it up, as is done in ordinary fistula. Mr. Porter, of the Meath Hospital, performed a similar operation, which terminated successfully.

705. 6. "*Elythro-plastie.*"—This name is given to the operation by which a portion of integument is taken from a neighbouring part, and applied to the vesico-vaginal fistula, and retained by sutures; the old connexion being maintained until union has taken place. It is exactly similar to the rhinoplastic operation for repairing noses.

It was suggested by Velpeau, but first practised by Jobert. Of his four operations, one patient was cured at once; one by a second operation; one died; and with one it failed.

M. Roux did not succeed with it.

I am not aware that any other surgeon has tried it.

706. 7. *Closure of the Vagina.*—When using the caustic for the cure of vesico-vaginal fistula, in the year 1833, M. Vidal de Cassis chanced to touch the vaginal mucous membrane with it; this caused considerable inflammation, and on making an examination subsequently, he found the sides of the vagina adherent. The patient also observed that the dribbling of urine had entirely ceased. Unfortunately, a careless examination was afterwards made, and these adhesions were destroyed. But the hint was not thrown away, for on the next occasion, in the same year, M. Vidal de Cassis attempted to relieve the fistula in this way, and was perfectly successful, until the clumsiness of an assistant destroyed these adhesions also.

There is no doubt that in many cases this would be found a valuable means of relief.

Caustic of any kind will answer the purpose of exciting inflammation, though adhesion may not always take place.

I have seen a circle of the mucous membrane removed, and the parts brought together by suture, for the purpose of closing the orifice of the vagina, but union did not take place.

When we have recourse to this method, care should be taken to leave a very minute opening posteriorly for the escape of the menstrual fluid, if menstruation have not ceased.

707. 8. *The plug.* — If none of the means hitherto described afford a probability of cure, or fail upon trial, it is at least a comfort to know that we can still remove a portion of the distress caused by this frightful complaint, provided the irritability of the vagina be not too great to bear a plug.

Various cases of relief by this means are on record.

Dr. Gooch, in 1814, suggested to Mr. Barnes, of Exeter, the employment of an India-rubber bottle, of sufficient size to fill the vagina, and having upon one side of it a small piece of sponge, to be applied to the fistulous opening. Mr. Barnes used this with great benefit to his patient.

M. Dugès has proposed a similar plan, but the pessary was made of different materials.

Dr. Evory Kennedy has succeeded in taking casts (with wax) of the vagina with the fistula, in several cases; and from them he made moulds, and had caoutchouc bottles cast in the moulds. These were large enough to fill the vagina, and to close both the fistula and the outer opening, so as entirely to prevent the escape of urine.

I have attained the same object by means of a piece of sponge covered with thin bladder. It should be large enough to fill the vagina, and of a suitable shape. A narrow neck, of the dimensions of the vaginal orifice, is to be formed, by wrapping it with twine, which is to be covered with lint. The whole has much the shape of an egg-cup. It should be dipped in oil previous to being used, and then it can easily be introduced, and the stalk filling up the external orifice, no urine can escape. It can be removed and replaced by the patient herself.

Various other suggestions have been made, but either of these plans will relieve the patient from the constant dribbling and offensive odour, and will allow the excoriations to heal.

If the patient cannot pass water with the plug in situ, she should learn to withdraw it and re-introduce it herself.

708. 2. Recto-vaginal Fistula. — I have already mentioned that many of these cases are cured spontaneously; others, however, require the resources of art.

The plans of treatment for the cure of vesico-vaginal fistula, are almost all equally applicable to this accident.

The wound may be touched with caustic, or the actual cautery; the edges may be pared, or cauterised, and brought into contact; or the vagina may be filled with a plug.

All these methods have been tried, and with much greater success than in vesico-vaginal fistula; and the method of operation so closely resembles that already recommended that it would be unnecessarily tedious to repeat it.

709. 3. Laceration of the Perineum.—When this accident is of slight extent, it may not interfere with the comfort of the patient; but when extensive, it will be a cause of constant distress; and in either case, the proper cure of the wound is important; as, if callosities form, or irregular cicatrices, much impediment may be offered in subsequent labours. It is an accident much more common with first labours than afterwards.

It will be recollected that when the head of the child descends so as to fill the cavity of the pelvis, it necessarily makes pressure upon the lower part of the rectum and the sphincter ani; that it then receives a direction forwards and downwards, and successively distends the central space of the perineum and its anterior border.

When the perineum offers much resistance, as with first children, the mucous membrane of the posterior wall of the vagina, owing to its laxity of connexion with the subjacent tissue, is partially everted, and forms a kind of artificial perineum. This is almost always torn, but the rent may extend no farther; and if we examine the day after delivery, we shall find this mucous membrane retracted, and the true perineum untouched.

This is not to be confounded with the laceration of the true perineum, of which we are about to treat.

710. The *situation and extent* of the rupture vary according to the cause and the circumstances of the case.

1. It may commence at the anterior border, and extend *to* the sphincter ani; and this is the most frequent extent.

2. The rent may involve the entire perineum, and extend through the sphincter ani, laying the cavities of the rectum and vagina into one.

3. The central space of the perineum is sometimes ruptured, leaving the anterior edge (the fourchette) and the sphincter ani untouched. Cases are related by Hernu, Coutouly, Lachapelle, Meckel, Lebrun, Thiebaut, Frank, Martin, Moschener, Jungmann, Marter de Konigsberg, Trinchinetti, Merriman, Waller, Andrews, Douglas, Mekeln of Kettwig, Joubert. And a case occurred recently in Dublin.

The rent may run along the central raphe of the perineum, on one side, diagonally; or in the form of the letter V or Y.

In most of the above cases, the child actually passed through the central opening; but in some cases, by careful management, it was transmitted through the natural orifice without rupture of the fourchette.

4. The recto-vaginal septum, sphincter-ani, and part of the perineum may be torn, so as to permit the transit of the child, leaving the anterior portion of the perineum entire.

711. Causes. — The accident may arise from a deviation from the ordinary mechanism of parturition; from mal-conformation of the passages, or soft parts; from mal-presentation; or from mismanagement.

1. If the *sacrum* be too *perpendicular*, the head of the child, instead of receiving its direction anteriorly, in the direction of the axis of the lower outlet, will be forced downwards upon the posterior portion of the perineum.

2. If the *arch of the pelvis be too acute*, so as to prevent the presenting portion filling its upper part, extraordinary dilatation of the orifice of the vagina will be necessary, and the head will be pressed with unusual force upon the anterior part of the perineum.

3. A similar effect is said to be caused by a *thickened state* of the *urethra* and circumjacent parts, in the arch of the pubis.

4. The *too rapid passage of the head* may be attended with this accident. This may depend upon the extraordinary violence of the pains, or upon the small size of the head, which prevents it receiving the successive changes of direction from the plane surfaces of the pelvis, and the changes in the axes of the cavity and lower outlet.

5. *Exostosis* in any part of the pelvic cavity may so act upon the direction in which the fœtal head is propelled, that rupture of the perineum may result.

6. *Excessive breadth of the perineum*, by receiving the force of the descending head in its centre, may be a cause of laceration; because the head rests in the centre, and distends it, instead of gliding forwards to the anterior edge.

7. *Rigidity* of the perineum, or an old cicatrix, may resist the dilating power of the head, and ultimately give way under the employment of greater force.

8. The tissue of the perineum may be *weakened* by disease, or by too much pressure, so as to offer little or no resistance.

9. *Occlusion* of the lower outlet by the *hymen*. As this membrane, though much thinner than the perineum, is far less distensible, if it do not give way, the perineum may. I attended a case lately, in which the hymen resisted the pressure of the head (with strong pains) for two hours after the perineum was perfectly distensible, and in which there was every probability that the perineum would have been lacerated, had not the hymen ruptured. Laceration of the hymen may also be extended into the perineum.

10. *Mal-position* of the child's head, by presenting a longer diameter than usual to the lower outlet, may give rise to this accident.

11. *Mal-presentations*. — Face presentations, involving the passage of the head in its longest diameter over the perineum; breech, or footling cases, which do not receive a proper direction so readily as the head, may also lacerate the perineum. Dupuis relates a case, where one foot came through the vagina, and one was forced through the perineum.

12. The accident may arise from the woman being *awkwardly placed* for delivery, or from her *starting away* from the attendant; or from her *exerting too much voluntary force* at the time the head passes through the lower outlet.

13. The perineum may be torn, in consequence of *want of care when instruments are used*. They ought generally to be removed just before the head passes through the vaginal orifice.

From this detail of the causes which may produce or predispose to laceration of the perineum, it will be seen that it may not always be in our power to prevent its occurrence.

712. Symptoms. — If the laceration be very slight, no ill consequences will ensue; but if it extend to the sphincter, the patient will feel a want of support at the lower outlet, and a sense of "falling through." It is said to influence subsequent cohabitation, and certainly it will favour procidentia of the uterus.

If the recto-vaginal septum be torn, the condition of the patient will be very pitiable. The fæces (for some time at least) pass through the vagina involuntarily, and the utmost attention to cleanliness will not suffice to prevent the offensive smell, which renders the patient an object of disgust to herself and her friends.

The lochial discharge passing over the wound, will for a time prevent any natural efforts at cure; and the edges may become callous, or degenerate into ulceration.

When slight, the rent generally contracts, and is healed without our interference, after a short time; and even when the recto-vaginal septum is torn, partial union may take place, leaving only a fistulous opening, or a kind of valve may be formed, so that, under ordinary circumstances, the patient is partly relieved of her infirmity. But this is the work of time; it may be months or years.

713. Treatment. — 1. *Preventive management*. — A few words may not be misapplied in pointing out the best mode of preventing this occurrence.

1. Defects in the passages, which render the mechanism of expulsion

inefficient, may often be remedied by the application of the hand in such a manner as to give a direction forward to the head.

2. Direct support should be given to the perineum when distended; but this is frequently carried to excess, and produces the accident it is intended to prevent; it should be moderate and gentle, just so much as to support the parts, but no more. I must altogether object to any attempt to retard the passage of the child, as erroneous in theory, and mischievous in practice.

3. When the perineum is rigid and undilatable, benefit may be derived from fomentations with hot water, the use of warm oil, lard, or pomatum.

4. Under no circumstances is it justifiable to dilate the external orifice with the hand, as formerly recommended; on the contrary, instead of drawing back the perineum, it ought to be carried forward.

5. If laceration be threatened in consequence of the persistence of the hymen, it may be incised with a blunt-pointed bistoury.

6. The patient should always cease forcing, and remain perfectly quiet during the exit of the child.

714. 2. *Curative treatment.*—Slight cases, as I have said, will often heal without assistance. Even when the rent is more extensive, a cure may be effected without further interference than great cleanliness, keeping the patient in one position, so as to preserve the edges of the wound in contact, and constipating the bowels after free purgation.

If this do not succeed, we are advised to use a degree of compression, passing a binder around the hips, and a pad on either side of the perineum, so as to secure the apposition of the lips of the laceration.

Strips of adhesive plaster have been applied, but they do not answer.

In many cases either of these plans has succeeded, but in many cases also they have both failed, especially when the recto-vaginal septum is involved. However, we have still another resource —

In *the suture* which was first proposed by Ambrose Parè, and practised by Guillemeau, La Motte, Saucerotte, Trainel, Nöel, Dieffenbach, Roux, &c.

Before this can be attempted, however, the primary inflammation must have subsided; nor is it forbidden, even though a considerable time should have elapsed. M. Montain cured a case on which he operated thirty-six days after delivery, and others have succeeded at a more distant period.

Three different kinds of suture have been adopted—the *interrupted*, the *twisted*, and the *quilled* suture. Osiander, Dieffenbach, &c., succeeded with the *first*, but according to Duparcque, the success and failure have been nearly equal. Mr. Alcock cured one, and Mr. Bayer two patients in this way. Dr. Mettauer, of Virginia (U. S.), succeeded with metallic sutures; they were introduced, and the parts approximated, by twisting the ends together. They were removed in six weeks, and union found to have taken place.

The great objection to the interrupted suture is that the lips of the wound are not closely applied in the whole extent, and the union is often partial.

The same observation may be applied to the *twisted suture*, although it has succeeded with Morlanne, Saucerotte, Nöel, Dieffenbach, &c.

The *quilled suture* is evidently better adapted for the purpose, as the entire surfaces of the laceration may be brought into contact.

Dupuytren succeeded once; Roux and Dieffenbach several times; M. Dubois failed; but Mr. Davidson succeeded completely. He thus relates the case in the Lancet of May 4, 1839. "On the 6th of November, 1838, in company with Dr. Henry Davis, I performed the operation in the following manner: I passed deeply a strong double ligature, by means of a common curved needle, close by the edge of the rectum, and another, rather more than half an inch from the first, towards the vagina; after which I pared the edges of the wound, which I had not previously done, that I might not be annoyed by the oozing of blood, so as to be enabled to place the ligatures more accurately. The ligatures being introduced, I employed, as cylinders, two pieces of elastic gum catheter, about an inch and a half in length, one of which was placed in the loops which the double ligatures formed on one side, and the other between their separate ends, tying them firmly upon the cylinder. Baron Roux found in his cases that the use of the quilled suture caused an eversion of the edges of the wound; to remedy this, he had recourse to several small sutures, at different points between the different ligatures. To effect the same object, and also with a view of keeping the divided parts more closely and firmly in contact, I adopted the following plan, the materials for which I had prepared previously to the operation. I armed a curved needle with a piece of narrow tape, four inches long, having a knot at one end; this was passed down each end of both cylinders about half an inch, and brought outwards, the end of the tape being prevented slipping through by the knot; the tapes were then placed in such a situation as to be intermediate to the ligatures; this being done, I turned the cylinders gently towards the edge of the wound, and tied the corresponding tapes over it, which, I think, rendered it much more solid than any number of small ligatures could have done. The bowels were constipated by opium, the urine drawn off night and morning, and the diet consisted of small quantities of gruel and hard biscuit. The ligatures were removed on the seventh day, and union was found to have taken place throughout. The urine was evacuated naturally after nine or ten days; the bowels relieved on the seventeenth; and after six or seven weeks, she was able to go about as usual."

Dr. Colles has rarely succeeded in curing, though he has diminished the rent.

If there should be loss of substance, or contraction of the two sides of the perineum, so that they will not readily meet or remain in contact, Dieffenbach makes an incision through the skin, on each side.

The bowels should be well freed before the operation, and an opiate given, so as to constipate them; when union is attained, this may be remedied by an enema.

The catheter must be passed morning and evening for some time.

The diet should be spare: a little gruel and biscuit will answer very well. Of course absolute rest is necessary.

"If the radical cure fail," Dr. Burns observes, "the patient must use a compress, with a spring bandage, if the stools cannot be retained. But it sometimes happens that the torn extremity of the rectum, or the anterior

parts, containing a fragment of the sphincter or a portion of the internal sphincter, as it has been called, forms a kind of flat valve, which rests on the posterior surface at the coccyx, so that the orifice now resembles a slit, and the fæces, unless very liquid, remain in the hollow of the sacrum, and do not pass through the vulvular orifice till an effort be made to expel. Sometimes the perineum unites, but the septum does not, and the inner surface of the rectum protrudes into the vagina. In these cases the edges of the septum must be made raw, and stitches used."*

* Although laceration of the perineum in the female is easily treated when recent, yet if neglected until after cicatrization of the ruptured surfaces has taken place, it is to be viewed as a serious and very intractable accident.

Dr. W. E. Horner, Professor of Anatomy in the University of Pennsylvania, succeeded in affording, in a case under the latter circumstances, very great relief to the patient by an operation.

The rupture occurred in a young married lady during her first accouchment. After the birth of her second child, the case came under the notice of Dr. Horner. The laceration extended from vulva to anus; the parts were cicatrized over an inch in depth, and but one fissure was apparent from near the os coccygis to the clitoris. The patient,

Fig. 138.

1, 1. Vulva.
2. Anus.
3, 4. Lacerated perineum.
5. Right flap.
6. Left flap.
7. Clitoris.

Fig. 139.

1, 1. Vulva.
2. Anus.
3. Upper or left flap.
4. Lower or right flap.
5. Clitoris.

of rather a full habit, and well organized in other respects, was rendered miserable and helpless by a constant tendency to diarrhœa, only to be restrained by the constant use of opiates. Her life was unavoidably passed in seclusion, owing to her want of control over the natural evacuations. Much of the fœcal matter passed forward through the rima vulvæ, which added to the distress of her situation.

An operation was performed in the usual way, by paring off the cicatrix of each margin of the perineum, and then fastening it carefully with interrupted stitches along the rectal and vaginal edges of the rupture, the sphincter ani muscle being divided on each

side the anus; a procedure which Dr. H. considers proper in all old cases of this kind. Unfortunately, the menstual flux came on prematurely, and with the natural discharges of the vagina loosened everything like adhesion. The operation was a failure.

Nearly fifteen months subsequently a second operation was performed in this case. Additional difficulties had now to be contended against. The portion pared off from the perineum had reduced its extent; the slit from the vagina into the rectum had been elongated or deepened. If lateral adhesion had failed before, the failure now was still more probable. Under these considerations Dr. H. determined to modify the operation, so that if unsuccessful the condition of the patient should, at least, not be rendered worse by it. The patient being under the influence of a mixture of chloroform and ether; two flaps were made from the perineum and adjoining parts of the vulva, the one on the right and the other on the left.

By placing the base of the right flap below, and the base of the left flap above, upon crossing the two flaps a partition was formed between the rectum and vulva; the free side of the right flap forming the upper part of the rectum, and the free side of the left the lower part of the vagina. The approximation of the flaps and the contiguity of their raw surfaces were secured by interrupted stitches along the rectum and vagina. In forming the left flap, owing to a sudden contraction, its transverse part being first made, was not as desired, but fell short of Dr. H.'s intentions. For the first ten days or so there was a strong indication of success. A large firm stool now occurred, and on examination immediately afterwards the flaps were found not to be adherent. They were, however, in situ, so that the partition formed by them between the rectum and vagina was still kept up. In a month after the operation the left flap had become shrivelled away almost entirely, and the right flap had lost one-half its original size, but still remained as a barrier betwen the two canals; and by the introduction of a linen compress into the vagina, upon the flap, so as to keep it in its place, the discharge of fœces was regulated, so that there was no diarrhœa. The patient felt the call for defecation, could make timely provision for it, and was really improved in respect to comfort. Upon an examination of the patient six months after the operation, it was found that the indications of an operation having been performed had subsided. Upon a superficial examination there appeared to be a regular division between the anus and vulva — a reproduction of the perineum. The latter was only however the claustrum made by the operation — the edge was still loose, but had the effect of directing the rectal discharges backwards and the vaginal forwards. The recto-vaginal fissure had diminished much in depth, and the condition of the patient had been much improved. She could participate in her house-work — had a much better control of flatulent and fœcal discharges than formerly, and is apprized of their approach. "It yet remains to try," says Dr. H., "whether, by a protracted application of the milder escharotics to the free edge of the new claustrum, a perfect adhesion of it may not be obtained."

In performing the operation described above, Dr. Horner recommends that the vertical incisions for the flaps be first made, as the relaxation of the tension of the parts affects much the state of the flap when the transverse cut is first made, and thus interferes with the plan of the operation. — (*Amer. Journ. of the Med. Sciences, Oct.* 1850.) — EDITOR.

CHAPTER XXI.

PARTURITION.—CLASS III. COMPLEX LABOUR.

ORDER 6. INVERSION OF THE UTERUS.

715. This is a very rare complication, but a very distressing and dangerous one. It is neither more nor less than a turning of the uterus inside out.

The fundus descends through the os uteri, forming a cavity lined by the peritoneum, open towards the abdomen, and containing the ovaries and fallopian tubes, whilst that which was formerly the lining membrane of the uterine cavity, has become the external covering of the tumour.

The degree of inversion may vary: it may be *partial* or *complete*. Mr. Newnham, who has published a valuable monograph on this subject, has spoken of three degrees — *depression*, *partial*, and *complete* inversion. With regard to the first, he observes, "The fundus of the uterus is depressed within its cavity, but does not form a tumour in the vagina. The actual existence of this stage of the disease can only be known by introducing the finger into the uterus and by ascertaining the state of that organ by pressure upon the abdomen. By the *former process*, the fundus of the womb will be found to have approached the os internum, and by the latter a corresponding depression will be observed, instead of that regular contraction which is so familiar to every prudent practitioner. This state is generally accompanied with an effort to bear down, by which it is often converted into *partial* or *even complete* inversion." Of course so slight a change in the uterus is only perceptible through the parietes of the abdomen, when the patient has been recently delivered. In the unimpregnated uterus, such an examination would yield no information.

"When the inversion is *partial*," continues Mr. Newnham, "the fundus of the uterus is brought down into the vagina, forming a tumour of considerable size, presenting a semi-spherical form, and closely invested by the os uteri. In this case the depression of the fundus, observed through the parietes of the abdomen, will be considerably greater than in the former, and the edge of the cavity thus formed will alone be felt.

"In the *complete* inversion, the uterus will be found not only filling the vagina, but protruding beyond it, resembling in its form that of the uterus after recent delivery, only that its mouth is turned towards the abdomen. The os uteri may be felt at the superior extremity of the tumour, forming a kind of circular thickening at its apex, and the uterus is wholly wanting in the hypogastric region. This state is usually accompanied with inversion of the vagina."

716. Inversion may occur under very different circumstances; as, for example: 1. *Immediately after delivery*, as the result of a peculiar condition of the uterine fibres; of too quick delivery, &c. 2. *A few days after parturition*, though Newnham conceives that in these cases *depression*

of the fundus existed from the first. 3. Or *very gradually*, in consequence of a polypus attached to the fundus, the uterus not being pregnant. Capuron and Newnham doubt the existence of such cases; but I witnessed one myself, of the nature of which no doubt could be entertained.

We may be deceived, however, and suppose an inversion to have occurred gradually, because it has remained long undiscovered. Levret mentions a case occurring after delivery, which was not detected for five years.

By almost all authors, inversion has been divided into *acute* and *chronic*; not, however, confining the term chronic to cases where the production of the inversion has been slow, but including all those where it has existed for some time. The division appears to me to be useful and practical, though perhaps not conveying as much information as the terms "*reducible*" and "*irreducible*," which Dr. Radford of Manchester, has recently proposed as the substitute.

717. Causes. — Various causes are enumerated by authors, some of which are real, and some only fanciful. Most of them, however, are such as would act merely mechanically. It has been observed to follow very quick labours, especially if the patient be delivered standing, or if she make too violent efforts.

It may occur spontaneously, after the labour has been completed quite naturally, and in these cases it has been attributed by Dr. Radford to atony of the uterus, or to active contraction of one part, with an atonic condition of another.

Dr. Tyler Smith regards inversion as depending upon an irregularly active condition of the uterus, by which the fundus is first depressed, then carried downward by the annular contraction of the uterus, and, finally, completely everted.

It is very creditable, that violence in extracting the placenta may be followed by inversion; or, as Denman observes, "there is reason to believe that the uterus has been inverted, when, on account of a hemorrhage, or some other urgent symptom, the hand has been introduced within the cavity of the uterus, while in a collapsed or wholly uncontracted state, and the placenta being withdrawn before it was perfectly loosened, the fundus of the uterus has unexpectedly followed, and a complete inversion has been occasioned." Forcibly pulling the funis, for the purpose of detaching the placenta, may perhaps, under certain circumstances, give rise to this accident, but it is not a frequent cause.

Shortness of the funis, or the shortening of it by coiling around the neck of the fœtus, has also been alleged, but I believe without any foundation. Cords of ten inches long will permit, and have permitted, the exit of the fœtus without displacing the womb, and it is very rare indeed to find the funis so short.

As to the shortening of the cord when it is twisted around the neck, this can never be the cause of inversion, since it rarely occurs but when the cord is longer than usual, and it very seldom reduces the length of the cord below twelve inches (§ 181).

But inversion may occur quite unconnected with parturition, contrary to the assertion of Astruc and some of the older writers. If a tumour form at the upper part of the fundus uteri, it will first distend the uterus

mechanically, and then by its weight it may descend through the os uteri, dragging the fundus after it, and so produce complete inversion. Such a case I saw in Jervis-street Hospital, under the care of Surgeon Lynch.

A curious case of this kind is also related by Dr. Browne, in the Dublin Medical Journal.

718. Symptoms.—We shall first examine the symptoms which arise in *acute* inversion, *i. e.*, when it occurs soon after delivery, and when the displacement is nearly or quite *complete*. These are always serious and alarming, indicating the important nature of the accident. The most universal symptom is a sudden exhaustion or sinking, which comes on immediately after the inversion. It does not depend upon flooding, for it occurs in many cases where there is no hemorrhage. The countenance becomes deadly pale, the voice weak, the pulse rapid, small, and fluttering, nausea and vomitings occur, &c., so that the patient is suddenly threatened with the extinction of life.

Several authors speak of more decidedly nervous symptoms, and even of convulsions; but by some, at least, the restlessness and agitation preceding dissolution, appear to have been mistaken for convulsions.

When the inversion is slighter in degree, these phenomena will generally be found less strikingly marked.

Hemorrhage, even to a very large amount, not unfrequently occurs, aggravating, though not changing, the symptoms already enumerated, and materially enhancing the danger of the patient.

Mr. Newnham observes, "When the uterus has become inverted, immediate hemorrhage takes place, which is quickly followed by faintness, and a sense of fulness in the vagina, and, in the greater number of instances, almost by immediate dissolution."

Our suspicions of inversion will be excited when this persists longer than usual, and an examination should instantly be made to ascertain the cause, if possible.

In many cases, however, there is no hemorrhage at all, or not in proportion to the inversion, but merely the nervous symptoms and exhaustion; nor does the difficulty of rallying the patient seem to be less in these cases than in those accompanied by flooding.

There is generally a very violent uterine contraction, immediately preceding or accompanying the inversion, leading the patient to anticipate a second child: this supposition is further confirmed by the pressure of the inverted uterus as it passes through the pelvis. Even on examination *per vaginam*, we may be deceived, by mistaking the uterus for the breech of a second child.

The patient complains of great pain, with a sense of dragging from the loins, and occasional retention of urine. If pressure be made on the abdomen, we shall not be able to feel the contracted uterus, and this being at a time when it is large, constitutes a marked and valuable symptom.

When the inversion is incomplete, we may often feel the uterus above the brim of the pelvis, but having a cup-like depression superiorly.

If we examine *per vaginam*, we shall find a tumour, either in the cavity of the pelvis or hanging through the vulva. This tumour is globular, sensible, elastic, with a rough and bleeding surface, wider below than above, where it is tightly encircled by the cervix uteri. If the displace-

ment be not reducible, it sometimes happens that the tumour is attacked by inflammation, running on into sloughing and gangrene, owing to the strangulation caused by the contraction of the cervix, and ending in the death of the patient. If the placenta have not been previously expelled, it will be found adherent to some part of the tumour, adding greatly to its bulk.

A considerable difference in the size of the tumour will be observed according as the inversion is *complete* or *incomplete*, recent or of old standing.

If quite *complete*, we may acquire further information from a visual examination. The tumour is of a red colour when the inversion is recent, but gradually becomes of a dull brown.

If *incomplete*, we shall still be able to detect it in the vagina, though if there be *depression* merely, we may not be able to reach it.

The foregoing are the most prominent symptoms of *acute* inversion; those which characterize the *chronic* stage of the disease, whether that stage be the issue of an *acute* attack or the result of a gradual displacement, are, of course, much less formidable.

The patient is subject to occasional irregular hemorrhages, and to a constant and profuse mucous discharge during the intervals.

Every month the surface is observed to be covered with red drops, which are, in fact, the menses.

The patient complains of pain, a sensation of weight in the pelvis, and dragging from the loins.

If the uterus protrude through the external parts, its sensibility will gradually diminish in consequence of the formation of a kind of epithelium upon its surface; and if it be exposed to rude contact, or if acrid secretions be allowed to accumulate upon it, circumscribed inflammation may occur, followed by ulcerations either superficial or profound, and involving some danger to the patient, if not remedied.

The constitution of the patient sympathises deeply with so extraordinary an accident. After recovery from the state of exhaustion or nervous depression, into which she was at first thrown, the repeated hemorrhages and constant leucorrhœa will render her countenance pale and exsanguined, and subject her to various secondary symptoms, such as syncope, dropsical effusions, hectic, &c.

719. Terminations. — The patient may die from exhaustion or from hemorrhage soon after the accident, according to Heister, Peu, Levret, Giffard, Windsor, Clarke, Denman, Boivin, and Dugès; or from the more distant consequences of the repeated hemorrhages, as related by Mauriceau, Haighton, Cooper, Windsor.

Fatal cases are also related by Peu, Portal, Vanderweld, and Millot, Chapman, Saviard, Heister, Smellie, and Mauriceau. Boivin and Dugès add, that "death following a very few days after the inversion, may have been occasioned by pains, convulsions, and syncope, caused even by the violence which the uterus has undergone."

Distension and inflammation of the bladder may occur, involving considerable danger.

The inverted uterus may be strangulated, and be separated by sloughing or gangrene with great danger, although cases are on record where this termination issued favourably.

Or, if the patient do not sink from the primary shock, and if no destructive process take place in the tumour, it will, after a while, shrink very much in size, and the patient may suffer comparatively very little annoyance. Denman mentions the case of a patient who consulted him for an inverted uterus, twenty years before her death; and Lamotte (*Obs.* 412) another, "in which the inversion was complete thirty years before."

Very rarely, the detruded organ has become the seat of malignant disorganization, either cancer or corroding ulcer.

720. Diagnosis.—The facility of the diagnosis will depend very much upon the extent of the inversion; when incomplete, it is very difficult, and, even when complete, it will often require great care. It is less obscure if the examination be made soon after the accident.

1. If *incomplete*, it may be mistaken for *polypus uteri*, but it will be distinguished by its bleeding and rough surface, by its insensibility, and by the "*cul de sac*" within the os uteri.

2. If *complete*, it will resemble *prolapse of the uterus*, but may be distinguished by the period of its occurrence, by the flooding, by the absence of the smooth vaginal covering of the bladder anteriorly, and of the os uteri inferiorly.

3. It may be distinguished from *prolapse of the vagina* by its hardness, its rough flocculent and bleeding surface, and by its unvarying size.

The value of some of these characteristics, such as the hemorrhage, the state of the surface, and the size of the tumour, is limited to a short period after the accident, and to those cases which occur after delivery.

721. Treatment. — 1. Of *acute* inversion. Our first object is unquestionably to reduce the displaced organ; and if we are on the spot when the accident occurs, it is in general not very difficult. It is of the last importance that the reduction be attempted instantly. Every hour increases the difficulty, and the lapse of four or five, according to Denman, may render it impossible. The period when the inversion becomes irreducible, will be found to vary somewhat in different cases, and according to the experience of different practitioners.

There is also a great difference according as the inversion is complete or incomplete. It has been stated to have been reduced spontaneously, when the fundus uteri was merely depressed, and even when the displacement was complete.

But no anticipation of such an occurrence will justify our losing a moment in attempting to re-invert the uterus. The protruded organ should be grasped firmly and passed in through the vaginal orifice, followed by the hand (previously well oiled) which, when in the vagina, should be closed and formed into a cone, and made to press mainly upon the fundus uteri. No effect will be produced upon the inversion until the vagina shall have been put upon the stretch; but then, after some time, it will be found to recede, and on being still further pressed, it suddenly starts from the hand (like a bottle of India rubber when turned inside out), and the organ is restored to its natural condition.

The hand (now in the cavity of the uterus) is not to be withdrawn, but rather expelled by the uterine contraction. This will ensure the patient against a repetition of the accident. We should also assure ourselves, before the removal of the hand, that the restoration has been complete.

Mr. Newnham advises that we should endeavour to "return first that

portion of the uterus which was last expelled from the os uteri." It will be found very difficult to attend to this minutely when the hand with the uterus is in the cavity of the pelvis, for want of room; and whilst the tumour is external, the re-inversion does not take place; it is expressly stated by several authorities, that they did not feel the reduction properly commence until the vagina was stretched to its full extent.

722. In many cases the placenta remains attached to the womb at the period of inversion, and different opinions have been held as to the propriety of removing it before reducing the displacement. Baudelocque, Gardien, Capuron, Boivin and Dugès, Radford, and others, recommend its prior removal, but Denman, Clarke, Burns, Carus, Newnham, Blundell, Gooch, &c., as decidedly oppose it. Mr. Newnham remarks, "It has been recommended by several respectable authorities to remove first the placenta, in order to diminish the bulk of the inverted fundus, and thus facilitate the reduction. But it is surely impossible that this proceeding can be attended with any beneficial consequences, whilst the irritation of the uterus would necessarily tend to bring on those bearing-down efforts, which would present a material obstacle to its reduction, and would increase the hemorrhage, at a period when every ounce of blood is of infinite importance." "Besides, returning the placenta while it remains attached to the uterus, and its subsequent *judicious* treatment as a simply retained placenta, will have a good effect in bringing on that regular and natural uterine contraction which is the hope of the practitioner and the safety of the patient."

It may be doubted, I think, whether the removal of the placenta is attended with so much danger; for in many instances it has been found impossible to reduce the uterus in consequence of the great addition to its bulk, which the adhesion of the placenta occasions; and in such cases there is no hesitation about the propriety of removing the placenta, nor have I met with any evil effects recorded as the result of so doing.

723. When the tumour is in danger of strangulation from the circular band of the fibres of the cervix uteri, or in case such band should seriously impede the reduction, it has been recommended to divide it with a bistoury.

Of course the bladder and rectum should be emptied previous to returning the uterus, unless we are present at the moment the accident occurs; at that time, the operation occupies so short a time, that catheterism may be deferred until afterwards, and constipation for twenty-four hours will rather be an advantage. If the inverted uterus and the neighbouring parts should be much swollen, or if the patient be feverish, it may be necessary to take away some blood and foment the parts before attempting the reduction.

724. But should the disease be of some days' standing, are we to look upon the reduction as hopeless? Certainly not. There are cases on record of the attempt having been successful after days and weeks have elapsed, and the condition of the patient is so distressing that no means, however apparently unlikely, should be left untried. In Loffler's case, 6 or 7 hours had elapsed; 17 in Mr. White's case; 24 in Mr. Wynter's; 27 in Mr. Dickenson's; 3 days in Mr. Cawley's; 7 in Dr. Radford's (case 6); 8 in MM. Choupart's and Anè's; 8 in Mr. Ingleby's; 10 or

12 in M. Lauverjat's; 13 in Mr. Hoin's; and 12 weeks in Dr. Belcombe's.

Plenck advises dilatation of the os uteri before attempting the reduction, and perhaps in some cases this may be possible.

If we succeed in restoring the womb to its natural state and situation, great care will be requisite to avoid a recurrence of the accident, or, what is more likely, a prolapse of the uterus.

The patient should remain longer than usual in the horizontal position, with the head low, the pelvis elevated, and the knees bent. A dose of opium will be found very useful, and, if there be much exhaustion, it must be repeated, and stimulants in proper quantity be given.

A pessary has been advised, in order to maintain the uterus in its place, but this will very rarely be necessary. When the lochial discharge has entirely ceased, it may be beneficial to use some astringent injections into the vagina once or twice a day, especially if leucorrhœa be present.

725. If the inversion be *irreducible*, we must then consider how far it may be advisable to content ourselves with palliative remedies, such as returning the tumour into the vagina to protect it from injury, and supporting it either by a bandage and compress, as recommended by Dr. Hamilton for prolapsus uteri, or by a pessary.

Should this plan not be practicable, or fail of success, it may then be a question as to the propriety of extirpation. There is abundant evidence to prove that life may be preserved after the loss of the womb. Rousset relates a case when the uterus was destroyed by gangrene, and the patient recovered; and Rousset, Primrose, Radford, and Cooke, have given cases in which the uterus appears to have sloughed off, without compromising the patient's life.

This being the case, there is every encouragement, within certain limits, to effect that removal by art which nature thus so beneficially accomplished. In this opinion Sir C. Clarke fully coincides; he observes, "In those cases of inversion of the uterus where the woman has *passed the menstruating age*, when her comfort is destroyed by the disease, and when the profuseness of the discharge threatens her with death, from the debility which it produces; it may be advisable to recommend the performance of an operation, which has been attended with success, viz., the removal of the inverted uterus itself." "How far it may be right to resort to this operation *during the menstruating part* of a woman's life, the author has no means of judging."

The operation, however, has been performed during the "menstruating part of a woman's life," with complete success.

We may therefore conclude that the operation is perfectly justifiable, provided 1st, that the patient is in a fit state of health for an operation; and 2dly, that the uterus be not affected with schirrus or cancer.

The operation has been successfully performed by Ambrose Parè, Petit, Carpi, Sclevogt, Vater, Laumonier, Bouchet, Boudol, Dessault, Hunter of Dumbarton, Chevalier, Johnson, Hamilton, Clarke of Dublin, Newnham, Windsor, Davis, Hull, Blundell, Moss, Lassere, &c.

Other cases less fortunate are on record.

The operation consists in applying a ligature of silk, whipcord, fishing-line, or silver wire, around the uterus at its highest part, and gradually tightening it, as the patient may be able to bear it, until the uterus is

entirely separated. Or a double ligature may be passed through the centre of the neck of the uterus, and each half included in a separate ligature.

Or, lastly, we may prefer, after tightening the ligature to a certain degree, to remove the uterus immediately by cutting below the ligature. Before doing this, it will be necessary to satisfy ourselves of the adequacy of the ligature to restrain any hemorrhage.

The symptoms which arise after the application of the ligature are just such as we might expect from the strangulation of so important a viscus. The patient suffers from nausea, vomiting, and pain, which gradually diminish in the more favourable cases, but which are the prelude to peritonitis in the fatal ones. When these symptoms are violent, it will be necessary to loosen the ligature, and wait some hours before again tightening it. A dose of opium should also be given, and the bowels kept free by enemata. The strength of the patient should be maintained by a nutritious, though not stimulating diet.

If the inversion be caused by or complicated with polypus, it may be necessary to remove both, and the polypus should be excised before applying the ligature to the uterus.*

* Extirpation of the uterus, when it is the seat of no malignant disease, is a terrible operation, and, under the circumstances mentioned in the text, of doubtful propriety. Not only have some women lived many years afflicted with inversion, but in several instances without any great pain or suffering in their general health. In some cases, too, the uterus has returned spontaneously, after the lapse of considerable time, to its natural condition, and the individuals have conceived and borne children. Several very instructive cases of the kind are related by Professor Meigs, in his edition of Colombat, two of which occurred under his own notice. — Editor.

CHAPTER XXIV.

PUERPERAL FEVER.

726. Having now terminated the series of abnormal deviations from natural labour, and the various accidental complications of that process, I shall add a chapter or two upon some of the more formidable diseases of childbed, referring the reader for fuller details and references to my work on diseases of women.

Puerperal Fever is probably the most fatal disease to which women in childbed are liable, and is by no means of rare occurrence.

Its phenomena vary very much, and it has consequently been differently described, and under various names, such as Puerperal Fever, Childbed Fever, Peritoneal Fever, Low Fever of Childbed, &c.

Another source of apparent contrariety has been the prevalence of the disease epidemically, and the varying characteristics of these epidemics. Unfortunately the uniformity of the disease was assumed until comparatively recent times; and, as Dr. John Clarke observes, each author erected his own experience into a standard by which to judge of the descriptions and practice of others.

According to Dr. Hulme's researches, the older writers were not ignorant of this disease. It is described by Hippocrates and Avicenna. Plater (1602) makes it to consist in inflammation of the uterus. Sennert (1656) describes it, and recommends bleeding. Riverius (1674) attributes it to suppression of the lochia, and Sylvius (1674) to deficiency of the lochia. Willis (1682) takes the same view of its nature as Plater.

It is mentioned by Raynalde, Pechey, Strother (by whom it was first called Puerperal Fever) and other early English writers; by Viardel, Peu, Mesnard, and other ancient French authors, and by the Germans.

727. From careful investigation it has been proved that the disease prevails epidemically, and that it is more virulent in hospitals. It is everywhere more frequent among the lower classes than the higher. In Dublin this is even more remarkably the case than in London.

That the cause of the prevalence in lying-in hospitals is the number of patients in a ward, the want of proper ventilation, and the too rapid succession of fresh patients before the wards have been properly cleansed, is rendered almost certain by the success which has followed attempts at remedying this evil.

These four points—isolation of patients, cleanliness, ventilation, and allowing the ward in which the disease has appeared to be idle for a while, are the chief means of guarding against the disease in hospitals; and in private practice we can do little more than has been laid down in the Rules for the Management of Lying-in Women.

For the purpose of giving a more distinct view of the prevalence of puerperal fever, I have made out (as accurately as possible) a chronological list of the different epidemics, with the names of the authors by whom they are noticed or described, and the pathological characteristics when ascertained.

Date of Epidemic.	Place.	Author.	Local Affections.
1664	Paris,	Peu (Lee),	
1746	Paris,	Malouin, Jussieu,	Peritonitis, Hysteritis, &c. Disease of Ovaries.
1750	Lyons,	Doulcet,	Peritonitis, U. Phlebitis.
1750	Paris,	Pouteau,	Hysteritis erisipelatous.
1760	London,	Leake,	Inflam. of Omentum, &c.
1760-61	Aberdeen,	Gordon,	
1761	London,	White,	Peritonitis.
1767	Dublin,	Jos. Clarke,	
1770	London,	Leake,	Peritonitis (partial).
1771	London,	White,	
1773	Edinburgh,	Young,	
1774 to 81	Paris,	Tenon, Doulcet, &c.	
1774-87, 88	Dublin,	Jos. Clarke,	Peritonitis.
1782	Paris,	Doulcet,	Peritonitis, Hysteritis.
1783	London,	Osborn,	Peritonitis.
1795	Vienna,	Dr. Jaeger,	Peritonitis, Phlebitis.
1786	Paris,	Tenon,	
1787	Göttingen,	Osiander,	
1788	London,	Jos. Clarke,	Hysteritis, Peritonitis, &c.
1787-8	London,	Do.	Peritonitis, Hysteritis, &c.
1789-90, 91, 92	Aberdeen,	Gordon,	Peritonitis.
1803-10, 12, 13	Dublin,	Collins, Douglas,	Peritonitis.
1808	Barnsley, Yorkshire,	Hey,	Peritonitis.
1812-13	Leeds, Yorkshire,	Hey,	Peritonitis.
1813	Sunderland, counties of Durham and Northumberland,	Armstrong,	Peritonitis.
1811	Heidelberg,	Naegelè, Bayrhoffer,	
1812	Holloway, London,	Dun,	Peritonitis.
1814-15	Edinburgh,	Hamilton,	
1816	Paris,	Tenon,	U. Phlebitis, Hyster. Perit.
1817-18	Pennsylvania, U. S.	Dewees,	Peritonitis.
1818-19, 20-23	Dublin,	Collins,	Peritonitis.
1819	Vienna,	Boer,	
1819	Glasgow,	Burns,	
1821-22	Edinburgh,	Campbell,	Peritonitis.
1821-22	Glasgow, Stirling,	Campbell,	Peritonitis.
1827-28	London,	Gooch,	Peritonitis.
1827-28, 29	London,	Ferguson,	Peritonitis, Hysteritis.
1835-36, 38	London,	Do.	Phlebitis, &c.
1825-27,28,29	Dublin (Lying-in-Hospital),	Collins,	
1829	Paris (Maternité),	Tonnellè,	Inflam. of Peritoneum, Uterus and appendages, and Uterine Phlebitis.
1829-40, occasionally.	Dublin (Lying-in-Hospital),	E. Kennedy,	
1831	Aylesbury,	Ceeley,	
1833-34	Vienna,	Bartsch,	Uterine Phlebitis.
1836-37	Dublin (New Lying-in-Hospital),	Beatty,	Peritonitis, Pleuritis, &c.

728. An examination of the foregoing table will render it no matter of surprise that authors should differ as to the *pathology* of this affection,

and as each appears to have regarded his own experience as a standard for all, we cannot wonder at, though we must ever regret, that various and bitter controversies should have arisen in consequence. It would occupy far too much time to enter upon various arguments adduced by different writers in favour of their own views; it will be quite sufficient to enumerate the opinions, and to classify the authorities, referring the reader to the various sources of minute information already quoted.

Puerperal fever, then, has been regarded as

Inflammation of the Uterus, by

Hippocrates,	F. Plater,	La Motte,	Villars,
Galen,	Sennert,	Sydenham,	Astruc,
Celsus,	Riverius,	Böerhaave,	Pouteau,
Ætius,	Sylvius,	Van Swieten,	Denman.
Paulus Avicenna,	Strother,	Hoffmann,	
Raynalde,	Mauriceau,	Jussieu,	

Inflammation of the Omentum and Intestines, by

Hulme, Leake, La Roche.

Peritonitis, by

Waller,	Bichat,	Gordon,	Campbell,
Johnson,	Pinel,	Hey,	Collins.
Forster,	Gardien,	Armstrong,	
Cruikshank,	Capuron,	Clarke,	

Peritonitis, connected with Erysipelas, or of an erysipelatous character,* by

Pouteau,	Young,	Armstrong,
Home,	Abercrombie,	Hey,
Lowder,	Gordon,	Campbell.

Fever of a peculiar nature, by

Willis,	Doublet,	Hamilton.
Puzos,	Levret,	

Disorder of a putrid character, by

Pen, Tissot, Le Roi, White.

Disease of a complicated nature, by

Petit,	Kirkland,	Tenon,	Lee,
Sellè,	Walsh,	Tonnelle,	Ferguson.

Fever with Biliary disorder, by

Finch, Stoll, Doulcet.

729. Causes.—Various are the causes assigned by different authors, for the production of this disease.

"We also," says Mr. Moore, "find fever after parturition ascribed to difficult labour; to inflammation of the uterus; to accumulation of noxious humours, set in motion by labour; to violent mental emotion, stimulants, and obstructed perspiration; to miasmata; admission of cold air to the body, and into the uterus; to hurried circulation; to suppression of lacteal secretion; diarrhœa; liability to putrid contagion, from changes in the

* At the time of the prevalence of puerperal fever described by many of these authors, there was also an epidemic of erysipelas.

humours during pregnancy; hasty separation of the placenta, binding the abdomen too tight; sedentary employment; stimulating, or spare diet; fashionable dissipation; retained portions of placenta; floodings, from non-contraction, according to one; from violence, but not from non-contraction, according to another; to inflammation of the intestines and omentum, from the pressure of the gravid uterus against them; to atmospheric distemperament; to internal erysipelas; metritis, phlebitis; and contagion of a specific kind. It will be seen that some of the symptoms of the malady are mistaken for causes."

We cannot regard difficult labour as a frequent cause, though the condition in which the woman is left, will undoubtedly render her more obnoxious to the epidemic. Mental emotion is undoubtedly an efficient predisposing cause. Under its influence, females are peculiarly exposed to puerperal fever and are rendered less able to bear it. Several of the worst cases I have ever seen were evidently attributable to this cause. Under its influence, females are peculiarly exposed to puerperal fever and are rendered less able to bear it. Several of the worst cases I have ever seen were evidently attributable to this cause. Cold may be fairly admitted into this list. Whether portions of placenta remaining in the uterus, give rise to this disease, is as yet doubtful; I am inclined to think they may, but it is difficult to decide between the conflicting evidence.

Irritation of the intestines may certainly be propagated to the neighbouring tissues, and under the influence of an epidemic, may originate puerperal fever.

That hemorrhage during or after labour does not prevent puerperal fever there is abundant proof; but that it renders the patient more liable to it may be questioned.

To a certain extent atmospheric influence has a control over the disease; in damp, moist weather, it is much more prevalent, and less so in warm dry weather.

The following tables, showing the frequency of the disease during different months, are of considerable value in determining this question:—

TABLE I. (*Dr. Gordon's.*)

	Cases of Puerperal.		Cases of Puerperal.
October	13	April	6
November	8	May	6
December	12	June	
January		July	
February	8	August	5
March	6	September	5

TABLE II. (*Dr. Campbell's.*)

	Cases of Puerperal.		Cases of Puerperal.
1821 March	1	1822 January	7
" April	7	" February	6
" May	2	" March	5
" June	2	" April	4
" July	3	" May	4
" August	1	" June	3
" September	1	" July	2
" October	7	" August	1
" November	13	" September	3
" December	11	" October	2

TABLE III. (*Dr. Ferguson's.*)

——	1827.	1828.	1829.	1830.	1831.	1832.	1833.	1834.	1835.	1836.	1837.	1838.	Total.	——
January .	..	2	3	3	..	2	..	..	2	4	3	9	34	
February .	..	2	7	..	..	..	..	..	2	6	..	..	17	Hospital closed, Feb. 1838.
March . .	1	..	3	2	..	..	2	..	..	6	..	8	22	
April . .	3	..	1	1	4	1	1	3	2	6	3	9	34	
May . .	4	4	..	..	1	..	2	..	5	2	2	..	20	Closed from April to Nov. 1838.
June . .	..	3	..	..	..	1	2	..	6	4	..	..	16	
July . .	..	3	..	..	..	2	..	..	..	..	..	..	5	
August. .	..	3	1	..	..	..	..	..	..	..	..	..	4	
September	2	8	..	..	..	..	1	..	..	..	1	..	12	
October .	..	4	..	..	..	2	..	..	5	..	..	..	11	
November .	..	..	..	1	2	..	..	4	2	..	..	..	9	
December .	..	8	3	..	2	..	1	2	2	3	..	..	21	
Attacked .	10	37	24	7	9	8	9	9	26	31	9	26	205	Total attacked.
Died . .	1	7	6	2	2	5	3	5	10	9	2	20	68	Total died.

TABLE IV. (*M. Dugès, Journ. Hebdom. de Médecine.*)

	Cases.		Cases.
1819 January - - - - -	81	1819 July - - - - -	40
" February - - - - -	82	" August - - - -	40
" March - - - - -	65	" September - - -	53
" April - - - - -	47	" October - - - -	69
" May - - - - -	67	" November - - -	74
" June - - - - -	35	" December - - -	65

TABLE V. (*Delaroche, of Geneva.*)

	Cases.		Cases.
January - - - - - -	77	July - - - - - -	37
February - - - - - -	43	August - - - - -	36
March - - - - - -	76	September - - - - -	51
April - - - - - -	55	October - - - - -	51
May - - - - - -	35	November - - - - -	66
June - - - - - -	40	December - - - -	61

Thus the most injurious months in Aberdeen were October, December, November; in Edinburgh, November, December, January; in London, January, March, February, December, May; in Paris, November, October, February, in Geneva, January, March, February.

"In general, the cold months are most fatal. No death has occurred in the month of July, in the General Lying-in Hospital. The most favourable month in Paris and Geneva, is June; and August in Scotland, where the summer is about three weeks later than in England. Hence we may say that the warm months are beneficial."*

Whatever the epidemic influence may be, there can be no doubt that to it the majority of cases are attributable, especially the worst and most fatal.

730. Much has been written concerning the *contagion* or *noncontagion* of puerperal fever. Drs. Hulme, Hall, and Campbell, MM. Tonnellè, and

* Ferguson on Puerperal Fever, p. 278, note.

Dugès, &c., are in favour of the latter opinion, and Drs. Gordon, Hey, Walsh, Burns, Armstrong, Douglas, Robertson, Hamilton, &c., of the former.

In all diseases which are epidemic, it is extremely difficult to decide upon the question of contagion, inasmuch as the cases which support most strongly the contagiousness of the disease, may almost all be explained by the prevalence of the epidemic causes.

Nevertheless, there are some cases so marked, that I should not feel justified in denying that puerperal fever may be communicated by contagion.

731. We have seen that there are several varieties of puerperal fever, which have been differently classified by different authors, some from the symptoms, others according to the pathology. Thus Dr. Douglas describes three forms —

1. The inflammatory.
2. The gastro-bilious.
3. The epidemic or contagious (typhoid).

M. Tonnellè —
1. The inflammatory.
2. The adynamic.
3. The ataxic (irregular or nervous).

M. Martens. *Neue Zeitschrift*, &c., b. ii.
1. The inflammatory (where one organ only is affected).
2. The nervous (beginning with delirium).
3. The putrid.

Vigarous. (*Moore on Puerperal Fever.*)—
1. Gastro-bilious.
2. Putrid bilious.
3. Pituitous (vomiting of pituitous matter).
4. Hysteritis (phlogistic).
5. Sporadic (arising from cold).

Gardien —
1. Angiotemic fever, strictly inflammatory.
2. Adeno-meningic, slow, insidious fever, slimy tongue.
3. Meningo-gastric, bilious derangement, yellow skin, &c.
4. Adynamic.
5. Ataxic or nervous.
6. Fever, with local phlegmasiæ.

Dr. Gooch —
1. Inflammatory.
2. Typhoid.

Dr. Blundell —
1. The mild epidemic, with little peritonic tendency.
2. Malignant epidemic, with great pain.
3. Sporadic. Peritonitis limited.

Dr. John Clarke —
1. Inflammation of the uterus and ovaria.
2. Inflammation of the peritoneum.

3. Inflammation of the uterus, fallopian tubes, or peritoneum, connected with inflammatory affection of the system.
4. Low fever, connected with affection of the abdomen, which is sometimes epidemic.

Dr. Lee —

1. Inflammation of the uterine peritoneum, and peritoneal sac.
2. Inflammation of the uterine appendages, ovaries, fallopian tubes, and broad ligaments.
3. Inflammation of the mucous, and muscular, or proper tissue of the uterus.
4. Inflammation and suppuration of the absorbents and veins of the uterine organs.

Or, in other words —

1. Inflammatory puerperal fever, dependent on peritonitis.
2. Congestive, dependent on inflammation of the uterine muscular tissue.
3. Typhoid, arising from venous inflammation.

Dr. Ferguson —

1. The peritoneal form.
2. The gastro-enteric.
3. The nervous.
4. The complicated.

732. It appears to me, that neither of these classifications is altogether free from objections; but upon the whole, I prefer the plan adopted by Dr. John Clarke and Dr. Robert Lee, of making the local affection the basis of arrangement, as at least developing most strongly the essential facts of the disease.

The great defect of this plan is the coincidence of the diseases, which it places separately; thus, hysteritis, and affections of the ovaries, &c., are very often accompanied by peritonitis. Still, however, there is a broad line of distinction between them in many epidemics; and I must only guard against the defective arrangement, by stating strongly at the commencement, that it is not intended to describe the varieties as necessarily and widely distinct, as to symptoms and causes, in every epidemic; and in the course of my description, endeavour to point out the concurrence of the different local affections.

I shall thus divide puerperal fever, according to the predominant local affection, into five varieties, which I have placed in the order of frequency of occurrence.

1. Peritonitis.
2. Inflammation of uterine appendages.
3. Hysteritis.
4. Uterine phlebitis.
5. Inflammation of uterine absorbents.

733. 1. Inflammation of the Peritoneum. — This variety of the disease was the one observed in the epidemic in London, at Aberdeen, Leeds, Edinburgh, and Dublin; and it has occurred in other epidemics. It appears to affect the peritoneum covering the uterus primarily, and to

extend from thence to the remaining portion of the serous membrane, involving not unfrequently the uterine appendages.

The attack may commence even before delivery, of which I had an example; but more generally from twenty hours to three days afterwards. The first symptom is either sudden rigors, pain, or some variation in the pulse. Dr. Campbell has remarked that in some who were attacked early, the sinking of the pulse which takes place after delivery, in ordinary cases, was absent, and its frequency rather increased.

Generally speaking, the rigors are first noticed; to these succeed heat of skin, thirst, flushed face, quickened pulse, and hurried respiration. The heat of skin, however, soon subsides, and during the course of the disease, it may not exceed the natural standard.

To these symptoms succeed nausea, vomiting, pain in the head, and increased sensibility of the uterus. In some cases the uterine tenderness (not amounting to pain) is contemporary with the rigors, or immediately succeeds them.

Pain in the abdomen soon attracts notice. It generally commences in the hypogastrium, or in one of the iliac regions, gradually radiating over the abdomen.

The pain may be slight or severe, continuous, or in paroxysms — the intermissions being more remarkable as the disease advances. After the remission, the pain shortly returns with increased violence.

We are not, however, to consider the pain as pathognomic of the disease, for we sometimes see abdominal pain resembling that in puerperal, which afterwards disappears altogether. And in certain cases of undoubted puerperal fever, there is no pain, or pain of slight duration. I have seen three cases of intense puerperal peritonitis (as shown by dissection) in which there was neither pain nor tenderness.

Dr. Ferguson has carefully estimated the frequency of this symptom, and he has found that

The number of his patients	who had no pain was	.	.		19
"	"	who had pain for	1	day was	51
"	"	"	2	"	48
"	"	"	3	"	22
"	"	"	4	"	18
"	"	"	5	"	6
"	"	"	7	"	5
"	"	"	8	"	4

The pain from the first is accompanied with more or less sensibility of the hypogastrium; this tenderness becomes exquisite as the inflammation extends, until at length the patient cannot bear the slightest pressure; even the weight of the bed-clothes is intolerable, and the tension and pressure of the parietes are avoided, by lying on the back, with the knees drawn up.

The enlarged uterus can frequently be felt through the integuments, above the brim of the pelvis, at an early stage of the disease.

Shortly after the disease is established, the abdomen becomes tumid and tympanitic, and in some cases, at a more advanced stage, the presence of effusion may be detected.

The air which gives rise to the tympanites, may be contained either in the intestines, or the peritoneal sac.

The effect of the disease upon the lochial discharge varies; in the

majority of cases, it continues to flow as usual. In some, the quantity is diminished. And in a very few, it is suppressed.

The secretion of milk is much more uniformly influenced by the attack. If it have commenced before the incursion of the disease, it is suspended, and the mammæ become flaccid; if the disease precede, the secretion is generally prevented. It is remarkable, that a great number of the patients lose all interest in their infants, and even refuse to give them suck.

The pulse is uniformly high throughout the disease, varying from 110 to 140 in a minute, and towards the termination, to 160 and upwards. It is generally small and wiry, but is liable to modifications, from treatment, and from the peculiar character of the epidemic.

The tongue is generally coated with a whitish film in the centre, but red around the edges. In some few cases, it is dry and brown in the centre, with a yellowish or white fur at the edges.

The thirst is considerable at the beginning, and towards the termination of the disease, but much less during its height.

The stomach is disturbed at a very early period, and the nausea and vomiting continue at intervals throughout the attack. At first, the matter voided is merely the contents of the stomach, mixed with mucus; afterwards, bilious matter is ejected; and lastly, green, brown, and black fluids, constituting what is called the "coffee-ground vomit."

In many cases, the intestinal canal shares in the irritation, and diarrhœa results. This, by some, has been held as a favourable symptom; but by others, as an aggravation of the puerperal fever. My own observations would lead me to the latter conclusion.

The dejections vary in character and consistence, becoming very dark and fœtid towards the termination of bad cases.

The urine is generally turbid, or high-coloured, and somewhat diminished in quantity, and the patient has occasionally difficulty in voiding it.

Throughout the course of the disease, the skin is generally about the natural heat, and dry; but as it approaches a fatal termination, it becomes cold and clammy.

The intellectual faculties are rarely affected; the patient retains her consciousness and senses, till very near the end.

The countenance is much altered; the features are all drawn up, and expressive of great anxiety and suffering. A patch of crimson is observed on the cheeks sometimes, and is an unfavourable symptom.

Such are the symptoms, as laid down by those who have had the most ample experience in this fatal disease.

Its duration will vary, according to the virulence of the epidemic. Some cases have terminated fatally, on the first, second, or third day; others from the fifth to the tenth.

734. Morbid appearances.—The peritoneum *may* exhibit no sign of inflammation; but generally it is found more or less vascular, especially that portion of it covering the uterus.

Its substance is thickened, and in some instances softened.

The longer the duration of the pain, the more intense will be the redness, and the greater the thickening of the peritoneum.

It is frequently covered with a layer of lymph, which agglutinates the omentum and intestines together.

The omentum generally exhibits marks of inflammatory action, and in some cases the disease appears confined to it.

The organs covered by the serous membrane may participate in the inflammation.

More or less serum and lymph are found effused into the peritoneal sac. It does not vary in chemical composition from that in ordinary peritonitis.

It may be clear or turbid, of a yellowish white colour, with shreds of lymph floating in it.

Blood may be effused into the peritoneal sac, alone, or mixed with the serosity.

Puriform matter is frequently found, especially in the pelvis, around and behind the uterus, where the inflammation has apparently been most intense.

It is often contained in a cyst, which apparently is merely a concretion of the outer surface of the pus.

Effusion of puriform matter, or a reddish serum, is sometimes observed beneath the serous membrane.

735. Diagnosis. — 1. *From after-pains or hysteralgia.* These affections occur soon after delivery, and diminish or disappear by the third or fourth day — about the period when puerperal fever commences.

After-pains are accompanied by a perceptible contraction of the uterus, which is absent in puerperal fever.

The pulse is sometimes accelerated by after-pains, but is seldom steady in its frequency; in puerperal it never falls below its frequency at first, but generally increases.

The hypogastric tenderness in after-pains is not great, except during a pain, and it goes on decreasing—whilst in puerperal peritonitis, it rapidly increases.

The constitutional disturbance is incomparably greater in puerperal fever, and it augments every day; whilst in hysteralgia it diminishes.

The sedative, which generally relieves after-pains, has little or no influence upon the pain in puerperal fever.

Notwithstanding these distinctions, there are undoubtedly many cases in which the diagnosis is by no means easy at first; and our treatment should be arranged so as to err (if we be in error) on the safe side.

2. *From intestinal irritation.*—This affection frequently assumes many of the characteristics of puerperal fever. There are, however, several points of difference. It is generally accompanied by marked evidences of gastric and intestinal disorder. The tongue is loaded — there is flatulence, nausea, and vomiting, constipation, or diarrhœa. The abdominal pain is diffused, and does not radiate from the uterus, as in puerperal; neither is the uterus enlarged, or tender. The abdomen is not tense, nor very sensible to pressure. Puerperal fever sets in at an earlier period after delivery than intestinal irritation, and it causes greater constitutional disturbance.

3. *From ephemeral fever or weed.* The commencement of ephemeral fever may excite some alarm, from its resemblance to puerperal; but its duration is shorter, its decline rapid, and its constitutional symptoms less severe, than in puerperal fever. There is also far less abdominal irritation, and the breasts continue distended.

4. *From hysteritis.*—The main distinction is the character and situation of the tenderness; in puerperal peritonitis, the slightest touch on the abdominal parietes causes acute torture; whereas, in hysteritis, the patient can bear pressure very well, until we can feel the enlarged uterus. Any increase of pressure, after the abdominal parietes are in contact with the uterus, gives acute pain.

The symptoms of hysteritis are also more local.

736. Prognosis. — The general prognosis is unfavourable, even in sporadic cases, but still more so when the disease is epidemic.

Dr. Hulme declares it to be as bad as the plague.

Dr. Leake lost	13	cases out of	19
Dr. W. Hunter	31	"	32
Dr. Clarke	21	"	28
Dr. Gordon	28	"	77
Dr. Campbell	22	"	79
Dr. Armstrong	4	"	44
Dr. Lee	40	"	100
Dr. Collins	56	"	88
Dr. Ferguson	68	"	205

In the epidemic in Paris (1746), in Edinburgh (1773), and in Vienna (1795), none recovered.

Dr. Ferguson states, "If we take the results of treatment adopted in various puerperal epidemics, by various practitioners, we shall find that on a large scale, one in every three will die, with all the resources which medicine at present offers. To save two out of three, then, may be termed good practice in an epidemic season."*

737. Treatment.—It must be borne in mind, when any peculiar mode of treatment is advised, that the character of the epidemic is the test of its propriety. Forgetfulness of this rule has been the source of much controversy, and no slight acrimony. As Dr. John Clarke remarks, each author takes the epidemic he has witnessed as the type of all, and remorselessly condemns all treatment which does not agree with that which he has found successful. There is no question that the employment of antiphlogistic remedies, by Gordon, Hey, Armstrong, &c. was a great improvement upon the old methods; but in many epidemics this plan must be strikingly modified, or altogether abandoned. Having premised thus much, I shall describe the treatment which has ordinarily been found the most efficacious.

If the pulse be firm, a large quantity of blood should be taken from the arm. Dr. Gordon recommends from 20 to 24 ounces, at the beginning, and, if necessary, this may be repeated. The blood generally exhibits the buffy coat.

Should any circumstances forbid a repetition of the venæsection, a number of leeches (from 60 to 100, *Campbell*) may be applied to the abdomen, and when they fall off, the abdomen should be fomented, or covered with a light bran poultice.

The fomentation, or poultice, may be repeated at intervals, as it has a very soothing effect.

After full depletion, the next most powerful remedy is mercury, alone or in combination with opium. Without explaining its *modus operandi*,

* On Puerperal Fever, p. 112.

it is sufficient to state the fact, that it has been found to exercise a remarkable influence over inflammation of serous membranes. It may be given in large doses (gr. x. every three or four hours), or in smaller ones more frequently repeated (gr. ii. every hour); and it should be continued until an impression is made upon the disease, or until the mouth is affected, unless purging be induced.

After a decided effect is produced, the dose may be diminished, and the intervals lengthened.

For the purpose of preventing intestinal irritation, it is usual to combine it with Dover's powder of opium. Perhaps it is not too much to say, that the benefit of the opium in this combination is not confined to the prevention of intestinal disturbance, but that it exerts a positive and beneficial influence upon the inflammation.

Mercurial frictions are a valuable mode of affecting the system. They were first employed, I believe, by Velpeau, in this complaint, and are now generally used.

When the calomel acts on the bowels, it may be omitted, and the opium alone continued; and I have seen as much benefit from it alone, as from the calomel. Some years ago, I saw a case of puerperal peritonitis, in consultation with a friend, and we administered large doses of opium (gr. i. every hour), with the greatest benefit. Since then, several similar cases have occurred to me.

My friend, Dr. Stokes, was the first to point out the value of opium, in bad cases of peritonitis, where bleeding was inadmissible; and I have repeatedly verified his observations.

Tartar emetic was recommended by Hulme, and used by several since his time, with apparent benefit. The state of the stomach, in many cases, however, will prevent its exhibition.

Purgatives have been warmly recommended by some writers, (*Hulme*, *Denman*, *Gordon*, *Hey*, *Armstrong*, *Chaussier*, *Stoll*) and as strongly reprobated by others (*Baglivi*, *John Clarke*, *Cederskiol*, *Thomas*, *Campbell*).

"My own experience," says Dr. Ferguson, "with regard to aperients, is, that whenever they create tormina, there is the greatest risk of an attack of metro-peritonitis succeeding. This so constantly occurs, that I invariably mix some anodyne — usually Dover's powder, or hyosciamus, or hop, with the purgative."

If the bowels be constipated, an enema of turpentine and castor oil will be useful.

The spontaneous diarrhœa is not always beneficial, but will often need to be restrained by astringents, or opiates.

Emetics were employed before 1782, by English practitioners, and in 1782, they were recommended by Doulcet, of Paris, who relied upon them exclusively, and derived from them extraordinary success. Other practitioners have also used them successfully; but they have failed so often, as to have gone out of use, especially in these countries, perhaps in consequence of our mistaking the proper cases.

In 1814, Dr. Brennan, of Dublin, proposed the use of turpentine, which he praised, as almost a specific. He gave it in doses of a tablespoonful at a time, in a little water, sweetened. Drs. Douglas, J. A.

Johnson, Dewees, Payne, Kinneir, Blundell, and Waller, have found it more or less useful.

Dr. Clarke, and other practitioners, tried it, but without success.

It is certainly beneficial, when the intestines are tympanitic, especially in the form of an enema, and as a counter-irritant to the abdomen; but I have never seen it exert any remarkable influence upon the disease.

At an advanced stage of the disease, blisters are very useful. They may be applied to any part or the whole of the abdomen, and dressed with mercurial ointment.

Recolin, Dance, and Tonnellè, have recommended injections of warm water into the vagina and uterus, three or four times a-day.

Drs. Lee and Campbell have tried them in a few cases with decided advantage. I have frequently syringed the vagina with warm water, with benefit; but I never threw the injections into the uterus.

Hip baths have been found useful by Desormeaux and Collins; but the pain of moving the patient is an insurmountable obstacle to their frequent use.

Loeffler, and Ceeley of Alesbury, have seen good effects result from the application of cold to the abdomen.

The irritation of the stomach may be allayed by effervescing draughts, containing a few drops of laudanum, or by a few grains of the subcarbonate of potash, dissolved in aq. menth. virid.

A selection of these remedies will afford a tolerably good chance to the patient, if we are called early; but in many instances we shall fail, either in cutting short the disease, or in curing it ultimately. It is of the greatest importance, however, that all the means at our command should be tried perseveringly, and that our forebodings should not be allowed to diminish our exertions.

738. 2. Inflammation of the Uterine Appendages. — Under this head is included inflammation of the serous membrane, and proper tissue of the ovaries, fallopian tubes, and broad ligaments.

It is not always possible to separate the affections from inflammation of the peritoneal cavity, with which they are so often conjoined; but there are cases in which they exist alone, or predominate in a striking manner, or where the consequences of the disease continue longer in these parts.

Puzos has described such cases by the term, "*Dépôts laiteux dans l'hypogastre*," and Levret, as "*Engorgemens laiteux dans le bassin.*"

The observations of MM. Husson and Dance likewise prove, that this is a frequent, and often fatal termination of inflammation of the peritoneal coat of the uterus, and its appendages.

M. Tonnellè found 58 cases of inflammation of the ovary, and 4 of abscess, out of 190 cases of puerperal fever.

739. Symptoms.—As inflammation of the uterine appendages is generally combined with more or less inflammation of the peritoneal sac, it consequently presents similar symptoms; but in addition, we find local distress in the situation of these appendages.

The pain is somewhat less acute than in general peritonitis, and is seated in one of the iliac fossæ, or the lateral parts of the hypogastrium, extending to the groins, and down the thighs, accompanied with great tenderness on pressure.

An examination *per vaginam*, will often throw light upon the disease;

that canal will be found hot and painful at the upper part, and in some cases a tumour may be discovered through the parietes, laterally.

The disease generally commences with rigors, thirst, head-ache, quick pulse, &c., presenting an array of constitutional symptoms very similar to those in peritonitis, which, therefore, I need not repeat.

If the disease be extensive, there is generally observed much exhaustion following the first stage, and the attack may prove quickly fatal.

Should the disease not prove fatal, the attack may terminate —

740. 1. In *resolution*, without the organs being seriously injured; or in some cases, adhesions may be formed between contiguous portions of the serous membrane, which, though for the present innocuous, may be injurious subsequently. Boivin and Dugès relate a case, in which anteversion was caused by these adhesions.

If the fallopian tubes have been involved, the cavity of one or both may be obliterated, or they may become adherent to some neighbouring part, so as to prevent altogether their ordinary functions.

2. In *suppuration*. Matter may form in either ovary or broad ligament, and may escape into the peritoneal sac; through the parietes of the vagina or rectum; or through the abdominal parietes, near Poupart's ligament.

A number of such cases are on record, and several have occurred to myself, which I published in the Dublin Journal for Sept., 1843.

741. Morbid Anatomy. — In some cases, we find on dissection, that the disease has been confined to the serous membrane, presenting similar phenomena to those already noticed — thickening, effusion of lymph, or serum, &c.

The broad ligaments, fallopian tubes, and ovaria, are red and vascular. The morsus diaboli is of a vivid red colour, and sometimes softened, and in its cavity, or under the peritoneum, deposits of pus may be discovered.

Effusion of serum, or purulent matter, may also be found between the folds of the broad ligaments.

The ovaria may be imbedded in lymph, the product of inflammation of their serous coat. Sometimes they are swollen, red, and pulpy. One or both of these organs may be affected. Dr. Gordon mentions that in his cases of puerperal, the right ovary was always diseased, and the left healthy.

Upon laying open the ovaries, their structure will be found more or less diseased. There is a great increase of vascularity, and frequently a softening of the proper tissue. In a few cases it is utterly disorganized.

Blood is sometimes effused into the Graafian vesicles, so as to destroy their texture.

Pus may be found in small masses throughout the ovary, or that organ may be reduced to a sac, containing purulent matter, which often escapes through artificial openings, as already noticed.

742. Diagnosis. — The situation of the pain and tenderness, and the information obtained by an internal examination, are the only ground of diagnosis—and an uncertain one, it must be confessed—during the acute state.

If the disease pass into a chronic stage, and an abscess form, this will render the case sufficiently clear. The case in the Meath Hospital was

detected in this way, before the matter could be discovered from the surface.

743. Treatment.—Venæsection; but after one bleeding from the arm, it will be more beneficial to apply leeches to the tender part, followed by poultices. Calomel and opium will be necessary, and as useful here, during the acute stage, as in the form of disease previously described.

Vaginal injections of warm water, and hip baths, will be found very soothing

If there be evidence of matter being within reach, it will be advisable to make an opening for its escape.

If much pus be discharged, so that the constitution suffer, tonics, with wine, and generous diet, should be given.

744. 3. Hysteritis. — Inflammation affecting the proper tissues of the uterus has been frequently described. It is mentioned by Astruc, Vigarous, and Primrose. Pouteau met with it in the epidemic of 1750. Böer, and Ricker, have termed it Putrescirung, or Putrescenz der Gebarmütter; and Smith, Danyau, and Tonnellè, have recorded cases of it.

In certain epidemics, it is by no means infrequent. Out of 222 fatal cases of puerperal fever, M. Tonnellè found

Simple metritis . . .	in 79.
Superficial softening .	in 29.
Deep softening . .	in 20.

M. Dugès found the womb affected in 3 cases out of 4.

Dr. Robert Lee states that in 45 dissections, the muscular coat of the uterus was softened in 10 cases.

745. Symptoms. — These vary somewhat, according to the epidemic, and a great deal according to the severity of the attack. In the milder forms, where the disease has not proceeded so far as to disorganise the uterine tissue, I have usually found it to commence on the third or fourth day, and generally with rigors — followed by heat of skin, thirst, and head-ache.

The pulse rises to 100 or 110. The tongue is dry and furred. The countenance expressive of suffering, but without the pinched, drawn-up character we find in puerperal peritonitis.

The patient complains of pain, and tenderness in the uterine region; and upon examination, we find the uterus enlarged, hard, and tender.

The abdomen at first is soft, and without tenderness, *which is first felt when we perceive that we are making pressure upon the uterus.*

As the disease advances, the abdomen often becomes tympanitic; and in some cases the inflammation extends to the peritoneum.

The lochia are sometimes suppressed, but often unaltered. The secretion of milk is generally arrested.

Dysuria occasionally causes much distress.

746. The *severer* form of hysteritis — such as described by M. Tonnellè and Dr. Lee — is ushered in by rigors, followed by increase of heat, and head-ache. There is occasionally delirium, or other evidences of cerebral disturbance.

The countenance is pallid, anxious, and disturbed. The skin, at first hot and dry, becomes cold, and sometimes of a blue or yellowish tinge.

The respiration is hurried, the pulse rapid and feeble, and there is great prostration of strength.

The tongue soon becomes foul, and the lips covered with sordes. Nausea, vomiting, and diarrhœa are generally present.

The patient complains of pain at the hypogastrium, where the enlarged uterus may easily be felt, and is tender on pressure.

The lochia are either diminished or suppressed; and occasionally their quantity is changed, and they become acrid and fœtid.

747. Hysteritis may terminate — 1. In *resolution;* as in the case with the mild variety which I have described, and in which there is a gradual subsidence of the symptoms.

2. In *abscess:* which may open into the uterine cavity, or into the peritoneal sac. I had an opportunity of seeing a case of the latter kind, some time ago, in a patient, whose case has been published by my friend, Dr. Beatty.

3. In *softening*. This termination was observed 49 times by M. Tonnellè, and 10 times by Dr. R. Lee.

4. In *gangrene*. This has been described by M. Böer, in his valuable work, and by Ricker, and noticed by Siebold, Busch, Boivin and Dugès, Danyau, &c.

748. Morbid Anatomy.—The peritoneal coat of the uterus very often exhibits marks of inflammation. It may be vascular, and coated with lymph, or softened.

Its size is manifestly increased, and its substance soft and flabby. Small collections of purulent matter are sometimes found in its parietes, which in these spots exhibit various degrees of absorption.

The substance of the uterus may be, in patches, reduced to a mere pulp, of a dark purple, yellowish, or greyish colour, and occasionally of a bad odour. This softening generally commences at the inner membrane, and penetrates more or less through the substance of the uterus.

"The point of insertion of the placenta is the most ordinary seat of all uterine lesion, whether of abscess, softening, or phlebitis; the next point, the large and congested, lead-coloured cervix uteri."

False membranes of coagulable lymph are found on the lining membrane of the cavity, mixed with blood and lochia.

The *cause* of this peculiar softening has been much debated — some attributing it to a specific action of the parts, or to alteration of the blood, and others to inflammation; with the latter of whom I am disposed to agree.

749. Diagnosis. — When complicated with peritonitis, the diagnosis is very difficult; but when the uterus is alone affected, it is easier to distinguish it.

1. From *after-pains*, *weed*, &c. it differs very widely, in its persistence, and in the gravity of the accompanying constitutional symptoms.

2. From *puerperal peritonitis*. The most marked distinction between them is the tenderness on pressure; which, when the peritoneal sac is inflamed, is general and superficial, rendering the slightest pressure intolerable; whereas, in hysteritis, the abdomen will bear pressure very well all over, *until we ourselves feel that we are pressing the enlarged and hard-*

ened uterus. The only exceptions to this rule, I have met with, are those cases of peritonitis where there is no abdominal tenderness.

The pulse, in hysteritis, is weaker, and the patient sinks more rapidly than in peritonitis; the lochia are also more frequently disordered.

Prognosis. — In the severe form, the prognosis is in almost every case unfavourable; but of the milder cases, I have seen many recover.

750. Treatment.—In the mild variety, venæsection will be necessary, followed by leeches, poultices, and fomentations. The benefit of calomel and opium is seen here, even more strikingly than in peritonitis; most patients recover who are brought fairly under their influence. If the calomel disturb the bowels, it should be omitted, and the opium given alone.

When the acute stage has passed, I have seen great benefit from a succession of blisters over the region of the uterus.

The bowels should be kept free; but active purging is injurious. Enemata of castor oil and turpentine answer the purpose very well.

None of our remedies seem to have much power over the severe form; but antiphlogistics must be tried in the early stage; subsequently, opium, and tonics, or stimulants, with counter-irritation, are our only resources.

751. 4. Inflammation of the Veins of the Uterus. Uterine Phlebitis. — This form of disease has been frequently noticed by authors; amongst others, by Dr. J. Clarke, Mr. Waller, Meckel, Ribes, Louis, Dance, Tonnellè, Burns, Lee, Boivin and Dugès, Ferguson, &c.; and recently in a series of papers on "Metro-peritonite," by M. Nonat.

Nor is it very rare; for M. Tonnellè found pus in the veins in 93 cases; and in the thoracic duct in 3 cases out of 134; and Dr. Robert Lee, in 45 cases, had 24 of uterine phlebitis.

752. Causes. — Dr. Robert Lee considers that it may be the result of mechanical injury to the uterus, either during the labour, or by the force used to extract the placenta.

It may follow after hemorrhage, or arise from cold, or the decomposition of retained portions of the placenta.

It may be excited by any of the causes of the other varieties of puerperal fever.

753. Symptoms.—In women of previous good health, the attack commences generally in 24 or 36 hours after delivery. The patient generally complains of pain in the uterus, more or less acute, preceded, accompanied, or followed by rigors.

The uterus is tender on pressure, and the lochia and milk are both suppressed.

There is head-ache, and slight incoherence; a sense of general uneasiness, and sometimes nausea and vomiting, with acceleration of the pulse.

After a time, these symptoms are succeeded by increased heat of surface, tremors of the muscles of the face and extremities, rigors, great thirst, dry brown tongue, frequent vomiting of green fluid, rapid full pulse, hurried respiration, &c.

The head becomes more involved, and we find the patient in a state of

drowsy insensibility or violent delirium and agitation, followed by extreme exhaustion.

The surface of the body assumes a deep sallow, or yellow colour; and occasionally petechial or vesicular eruptions have been observed on different parts of the body.

The pain may or may not increase, but the uterine tenderness is certainly augmented, and the abdomen is often swollen and tympanitic.

In some very rare cases, there is little or no local distress, and the existence of the disease could not be discovered except for the secondary affections. Such was the case with a patient under my care. She had no uterine pain or disturbance — no tenderness on pressure; and yet, on the seventh day after delivery, a smart febrile attack preceded the formation of a large abscess, near the left elbow joint. Since then, a second has followed, on the top of the shoulder, and a third in the right arm, above the elbow.

754. The patient may die during the acute stage, but the majority live longer, and exhibit the most interesting phenomena, connected with this variety of puerperal fever, and distinguishing it from all others. I allude to the *secondary diseases of other organs.*

The *brain*, though often functionally disturbed (135 in 304, *Lee and Ferguson*), is not frequently the seat of organic disease. Its vessels are sometimes congested, and lymph diffused in the pia mater, or serum, into the ventricles. According to M. Dugès, there is arachnitis once in 266 cases.

Portions of the brain are occasionally softened and disorganised; or there is purulent infiltration into the cerebral substance.

In the *chest*, we find evidences of inflammation of the pleuræ, effusion of serum of the same character as that in the peritoneal sac, and occasionally effusion of blood.

M. Tonnellè found	Pleurisy . . .	in 29 cases.
	Effusion of serum .	in 8 "
	Effusion of blood .	in 6 "

The *lungs* are often greatly condensed, of a dark red colour, with infiltration of purulent matter. Or they may be in a state of "complete dissolution, having all the characteristics of gangrene, except in many cases its peculiar fœtor."

M. Tonnellè found	Pneumonia . .	in 10 cases
	Tubercles . .	in 4 "
	Abscess . .	in 8 "
	Gangrene . .	in 3 "
	Pulmonary apoplexy	in 2 "

The symptoms of the secondary affection in these cases (cough, dyspnœa, &c.) are but slight, and are completely masked by the more serious primary disease.

"The *heart* is often enlarged, softened, and friable; its inner membrane deeply stained; lymph and serum are also occasionally found in the pericardium. There are white patches on the outer covering of the heart. I have never remarked any peculiar disorganization of the great arteries; they are often intensely stained."

The *intestinal canal* is not frequently the seat of organic change. The mucous membrane of the stomach is sometimes inflamed, softened, and occasionally its coats are perforated, giving rise to peritonitis.

Between the mucous and muscular tissues, there is an effusion of clear reddish serum, when the vomiting has been excessive.

The mucous membrane of the intestines, also, may be softened, and the walls of the canal perforated.

M. Tonnellè found	Gastro-enteritis .	in 1 case.
	Enteritis . .	in 4 cases.
	Entero-colitis .	in 1 case.
	The stomach softened	in 8 cases.
	The stomach ulcerated	in 5 "
	The stomach perforated	in 5 "

The *liver* is occasionally diseased — its substance may be congested, softened, or contain abscesses. M. Tonnellè met three cases of abscess in the liver.

The structure of the *spleen* may be softened and disorganised. M. Tonnellè relates two cases of abscess.

"The *kidneys* present inflammation of their peritoneal coat, depositions of pus, and flakes of lymph, alterations in their veins, softening, and great engorgement: both kidneys are rarely attacked at once." "The ureters and bladder are more often the seat of pain and congestion, than of disorganised structure."

The *eyes* are also affected. The conjunctiva becomes inflamed, the eyelids swollen, lymph is effused into the anterior chamber, and the sight is destroyed. Cases of this kind are related by Dr. M. Hall and Mr. Higginbottom, although not by them attributed to uterine phlebitis.

The *joints* are attacked by inflammation, and sometimes the cartilages by ulceration; and the various products of inflammation are found within the capsular ligaments. M. Dugès has thus placed the joints in the order of frequency of disease: 1, the hip; 2, the elbow; 3, the knee; 4, the foot; 5, the metacarpus; 6, the shoulder. Dr. Ferguson has found the elbow and knee more frequently affected than the hip.

M. Tonnellè met six cases of abscess of the knee; two of the elbow; and two of the symphysis pubis.

Sero-sanguineous fluid may be effused into the *muscles* or cellular substance of the limbs, giving to them the appearance of erysipelas. M. Tonnellè mentions three such cases.

As to the extent of this infiltration, it may be circumscribed within a few inches, or it may extend between two joints, rarely occupying the whole limb.

An *abscess* may be formed in the muscles or cellular membrane of a limb; or a succession of abscesses may occur, as in the case I have mentioned; or the pus may be diffused through the various soft structures.

The quantity is sometimes enormous; the patient suffers much pain, and may be seriously injured, if the discharge continue long.

The symptoms in the latter case are those met with ordinarily in abscess, except that at the beginning they sometimes resemble a rheumatic attack.

755. Morbid Anatomy. — The primary morbid change is evidently in

the veins of the uterine region; their coats are thickened, and sometimes so much contracted as to render the canal impervious. The lining membrane is generally paler, and coated with lymph or pus, which may extend to a considerable distance.

The disease may be confined to the veins of the uterus, or may involve those of neighbouring parts. The spermatic vein is the one more frequently affected — then the hypogastric; but it may involve the renal veins, as far as the kidneys, or even the vena cava.

It is remarkable, that it is generally the veins of one side only that are affected, and that side is the one to which the placenta was attached.

When the disease affects veins distant from the uterus, the surrounding cellular tissue is hardened, and contains puriform matter.

"In a certain number of cases, no lesion can be discovered in the vein, but the presence of some unnatural fluid. It is disputed whether it is absorbed, or the product of venous inflammation. It is of little moment which of the two opinions be adopted; the disease depends not upon how the matter is produced, but whether it enters the circulation. Whether this be by absorption or by inflammation, puerperal fever is the result."

756. Diagnosis. — It may in many cases be extremely difficult to distinguish this from the other varieties, at least in the early stage.

Generally speaking, the pain and tenderness are more local and limited than in *peritonitis*, and at an advanced period the presence of the secondary disease will at once indicate its true character.

757. Treatment. — Severe cases of this species of puerperal fever appear to defy all our resources. When it is the prevailing characteristic of an epidemic, the vast majority will die.

"The two indications," says Dr. Ferguson, "are, 1. To attend to the local lesions. 2. Never to forget that these are not the disease, but merely the effects of a more diffusive, though concealed cause, to act on which our remedies should be directed. The rationale of the treatment, therefore, consists in the exhibition of such remedies as will act on this cause, and such as will alleviate or remove the local affections; taking care that in our attempt to effect the latter end, we do not so act on the constitution as to give additional energy to the more deadly power of the concealed cause."

This rule should direct our employment of leeches, blisters, calomel, and opium, &c., in the early stage, and stimulants and tonics in the latter.

758. 5. Inflammation of the Uterine Lymphatics. — This variety of puerperal affection was first noticed in France by M. Dance; and since by Boivin and Dugès, Tonnellè, Duplay, Cruveilhier, and Nonat;* the former found pus in the lymphatics in 32 cases, and in the thoracic duct in 3.

In this country, it was first recorded by Dr. R. Lee, in the following case, published in the Medico-Chirurgical Transactions.

"A woman, æt. 30, in an advanced stage of pregnancy, was admitted into St. George's Hospital, July 1, 1829, under the care of Mr. Cæsar Hawkins, in consequence of sloughing of the skin covering a diseased bursa of the patella. The removal of the bursa was followed by great

* Revue Med. Franc. et Etrang. for 1837.

constitutional disturbance, and on the 14th labour came on. Two days after, symptoms of uterine inflammation made their appearance, and on the 18th day death took place. Though the pain was relieved by bleeding, she never rallied after the attack. On examining the body, some puriform lymph was found in the pelvis, but there was no increase of vascularity in the peritoneum. In the broad ligaments, some fluid was also effused, and on each side numerous large absorbent vessels were observed, passing up with the spermatic vessels, to the *receptaculum chyli*, which was unusually distended. All these vessels, and the reservoir itself, were filled with pus; but that in the receptacle was mixed with lymph, so as to be more solid; the vessels themselves were firmer and thicker than usual. The thoracic duct was quite healthy. The uterus was scarcely contracted, and the internal surface of the lower half was soft and shreddy, and in a state of slough. The upper part, where no pus was found externally, was also healthy, or nearly so, on its inner surface.*

The local symptoms are exceedingly obscure, and the constitutional ones very like those in uterine phlebitis, and quite as severe.

759. On dissection, the lymphatics are found distended with pus, and generally at intervals, so as to give them a beaded appearance.

The secondary lesions are much the same as in phlebitis.

Treatment. — As yet we know of no remedies capable of controlling the disease.

* Med. Chir. Trans., vol. xv. p. 64. Lee, Diseases of Women, p. 46.

CHAPTER XXV.

PHLEGMASIA DOLENS.

760. This disease, under various appellations,* has been long known to the profession, although there has been much difference of opinion as to its nature. It was described by Roderick à Castro, in 1603, and subsequently by Mauriceau, Puzos, Levret, Petit, Leake, White, Hull, Trye, &c.

It consists in a swelling of one or both legs (simultaneously or successively), shortly after delivery, with pain and tenderness, and running a definite course. The left leg is more frequently affected than the right.

It may occur with first children, but it is more frequent after subsequent deliveries.

Women of a delicate constitution, or lymphatic temperament, are said to be the most liable to the attack, but especially those who have suffered from uterine irritation after delivery. Mr. Chatto's case followed extraction of the placenta.

It generally commences within a fortnight after delivery, sometimes on the third or fourth day, in other cases not till some weeks have elapsed. Of 22 cases observed by Dr. R. Lee, 7 were attacked between the fourth and twelfth day, and 14 after the second week.

761. Pathology. — Successive authors have given different theories touching the essential nature of this disease; and though we have recently become acquainted with the most important points of its pathology, it is not quite certain that even yet our knowledge embraces the whole series of facts connected with it.

Mauriceau considers it to be owing to a reflux upon the lower extremities, of certain matters which ought to have been evacuated by the lochia.

Puzos and Levret attributed it to deposits of milk (*dépôts du lait*) in the legs. This opinion has prevailed extensively in these countries; and with some practitioners it was customary to keep the child constantly to the breast, to prevent this metastasis when threatening, or to remove it when it has occurred.

In the year 1794, Mr. White, of Manchester, published an inquiry into the nature and cause of that swelling in one or both of the lower extremities, which sometimes happens to lying-in women; and he suggested or adopted the opinion, that the disease depends on obstruction, or on some other morbid condition of the lymphatic vessels and glands of the affected parts.

Mr. Trye, of Gloucester, in an essay on this subject (1792), attributed it to a rupture of the lymphatic vessels, as they cross the brim of the pelvis, under Poupart's ligament. Soon after this, Dr. Ferrier main-

* As milk leg, white leg, swelled leg, puerperal tumid leg, &c. By Dr. Hull, Phlegmasia dolens; by Dr. Cullen, Anasarca serosa; by Dr. Good, Bucknemia sparganosa; by others, phlegmasia lactea, œdema lactium, &c.

tained that there is a general inflammatory state of the absorbents in this disease.

Dr. Hull (1800) considered the proximate cause of this disease to be an inflammatory affection, producing suddenly a considerable effusion of serum and coagulable lymph into the cellular membrane of the limb. All the textures, muscles, cellular membranes, lymphatics, nerves, glands, and blood-vessels, he supposed to become affected.

So far, the theories depended upon *à priori* reasoning, not upon pathological facts; and the first light thrown upon the subject by *post mortem* examination was by the late Dr. Davis, Professor of Midwifery in University College, London, who, in 1817 examined the condition of the veins in a patient who had died with the disease, and found that they had evidently been the seat of extensive inflammation.*

After this he taught that phlegmasia dolens resulted from this cause, and in May, 1823, published a paper with cases and dissections in the Med. Chir. Trans. vol. xv.

"In January, 1823, M. Bouillaud related several cases and dissections, in which the crural veins were obliterated in women who had suffered from œdema of the lower extremities after delivery; and M. Bouillaud distinctly stated that he considered obstruction of the crural veins to be the cause, not only of the œdema of lying-in women, but of many partial dropsies."

It is but just to remark, that although this bears an earlier date than

* "Morbid appearances observed on examining the body of Caroline Dunn, March 6, 1817: — The left lower extremity presented an uniform œdematous enlargement, without any external discoloration, from the hip to the foot. This was found, on further examination, to proceed from the ordinary anasarcous effusion into the cellular substance. The inguinal glands were a little enlarged, as they usually are in a dropsical limb, but pale coloured, and free from the slightest sign of inflammation. The femoral vein, from the ham upwards, the external iliac, and the common iliac veins, as far as the junction of the latter with the corresponding trunk of the right side, were distended, and firmly plugged with what appeared externally a coagulum of blood. The femoral portion of the vein, slightly thickened in its coats, and of a deep red colour, was filled with a firm bloody coagulum, adhering to the sides of the tube, so that it could not be drawn out. As the red colour of the vein might have been caused by the red clot everywhere in close contact with it, it cannot be deemed a proof of inflammation. The trunk of the profunda was distended in the same way as that of the femoral vein; but the saphena and its branches were empty and healthy. The substance filling the external iliac, and common iliac portions of the vein was like the laminated coagulum of an aneurismal sac, at least with a very slight mixture of red particles; the tube was completely obstructed by this matter, more intimately connected to its surface than in the femoral vein; adhering indeed as firmly as the coagulum does to any part of an old aneurismal sac; but in its centre there was a cavity containing about a teaspoonful of a thick fluid of the consistence of pus, of a lightish brown tint, and pultaceous appearance. The uterus, which had contracted to the usual degree, at such a distance of time from the delivery, its appendages and blood-vessels, and the vagina, were in a perfectly healthy state. There was not the least appearance of vascular congestion about the organ, nor the slightest distension of any of its vessels. Its whole substance was, on the contrary, pale, and the vessels everywhere contracted and empty. The state of the abdominal cavity and its contents were perfectly natural. That the substance occupying the upper part of the venous trunk and the fluid in its central cavity, had been deposited there during life, from inflammation of the vessels, does not admit of doubt. I am also decidedly of opinion, in consequence of its firmness, and close adhesion to the vein, that the red coagulum in the femoral vein was the result of a similar affection extending along the tube, and that the passage of the blood through it, in the whole tract submitted to examination, must have been completely obstructed before death."

Dr. Davis' paper, yet the latter gentleman had been promulgating his views for six years previously.

In 1829 (I believe), Dr. Robert Lee, acting upon a suggestion of Mr. Guthrie's, succeeded in tracing the affected veins to their origin in the uterus, and found the disease equally marked there. He then added to Dr. Davis' observation, the fact that (at least in many cases) crural phlebitis is but an extension of uterine phlebitis.

MM. Petit, Gardien, and Capuron, regard the disease as inflammation of the lymphatic vessels and glands.

Dr. Burns considers the nerves as involved in the disease.

Dr. Campbell coincides rather with Dr. Davis and Dr. Lee.

Dr. Dewees rejects the pathological view, and is rather inclined to adopt that of Dr. Hull.

M. Bouillaud has written a very able article on this subject in the Dict. de Med. et de Chir. Prat. (1834), in which he includes inflammation of the symphyses, veins, lymphatics, and nerves, among the proximate causes of phlegmasia dolens.

It is evident that if we take pathological anatomy for our guide, we must conclude the disease to consist in inflammation of the veins of the lower extremities, in many cases propagated from the veins of the uterus; and that the interruption of the circulation through these vessels gives rise to the effusion of serum in the cellular tissue. This view also derives some support from the phenomena which result from phlebitis in other situations.

At the same time it is not impossible that some further information may be necessary, before we fully comprehend the true theory of the disease.

762. Causes.—The exciting cause is generally the impression of cold; and if Dr. Lee's views be of general application, we may add disease of the uterus, especially of that part to which the placenta is attached.

763. Symptoms.—As this disease generally occurs in women who have suffered from uterine irritation, or inflammation, and may even be caused by such condition of the uterus, it is not surprising that the ordinary premonitory symptoms should commence with pain or uneasiness in the lower part of the abdomen, extending along the brim of the pelvis: the patient is irritable, depressed, and complains of great weakness.

Sometimes, however, there are no precursory symptoms, the patient being suddenly seized with pain in the calf of the leg; or it may commence like rheumatism, affecting the back and hip joint.

When the disease begins in the pelvis, the pain speedily extends below Poupart's ligament down the thigh, to the ham, calf of the leg, and foot.

It is constant, but occasionally remitting, and not much relieved by posture, though a depending position materially increases it.

Shortly after the commencement, the inguinal region is tumefied and tense, and in a day or two the thigh becomes swollen, tense, white, and shining. This swelling may be confined to the thigh, or extend down to the heel, and it will vary much in amount; occasionally the leg is enormously increased in size, which is rather a favourable occurrence.

When the pain originates in the back and hips, the nates and vulva become swollen, glassy, and tense.

When the disease commences in the calf of the leg, the swelling is first

observed there, or at the ankles, gradually extending itself up the leg and thigh.

The temperature of the limb is generally increased, though sometimes it is below the natural standard.

At the commencement and decline of the disease, the limb pits upon pressure; but when the distension is great, it does not.

In most cases the femoral vein may be traced from the groin down the thigh, feeling hard, and rolling under the finger like a cord. When the attack is limited to the leg, however, this is not the case.

There is a degree of tenderness all over the limb, but it is very marked along the course of the inflamed vessel; there is neither redness nor discoloration.

The inguinal glands are generally swollen and hard; in some rare cases they suppurate.

Abscesses may form in the cellular membrane; and Burns states that mortification has occurred.

Either leg may be affected, though the left appears to be more frequently attacked; and it not unfrequently happens that the sound leg participates in the disease before the other is perfectly well, and then the disease runs a similar course a second time.

When once the swelling takes place the limb becomes useless; the patient can neither bend it nor place it on the ground.

The constitution, as might be expected, suffers considerably during the attack; the pulse becomes quick (100 to 140) though weak, the tongue white and coated, the thirst considerable, the countenance pale, the appetite is lost, the bowels deranged, the urine turbid. The patient is restless, and generally sleepless.

The internal genitals are tender, and the lochia sometimes diminished, or offensive, but more frequently unaltered.

Of course, these symptoms will vary in intensity, according to the violence of the attack; and when the acute stage is over (in ten days or a fortnight), the constitutional disturbance subsides, and the affection becomes local, and chronic.

764. Terminations.—1. It may terminate in *resolution*—the symptoms altogether subsiding, the effusion disappearing, and the patient recovering the use of her limbs.

2. The subsidence may be more *gradual*, the limb continuing swollen for months, and the patient being unable to use it freely.

In these cases there may be some thickening of the cellular tissue, and sometimes the veins remain varicose.

3. As already stated, *suppuration* may take place, even to a great extent, so as to change the character of the disease, and even to threaten danger from exhaustion.

4. *Death* may occur, either suddenly — perhaps as the patient raises herself in bed — or more gradually, from the secondary diseases consequent on phlebitis.

765. Morbid Anatomy. — On opening the limb, it is found to be distended by serum effused into the cellular membrane.

The vein is obliterated by clots of blood firmly adherent to its parietes, which are thickened; its inner membrane is of a deep red colour, the result, either of staining from the clots, or of inflammation.

A membrane of coagulable lymph may be found, instead of the clot, lining different vessels.

The veins may contain purulent matter.

The vessels which have been noticed as participating in these changes, are the femoral, the external, internal, and common iliacs of either side, the epigastric, spermatic, circumflexa ilii, the uterine, vaginal and saphena veins, and the vena cava.

Pus is also met with in the absorbents, and evidences of inflammation. The nerves are also inflamed in some cases.

A series of small abscesses may be found in the substance of the limb, or a single one of large size.

Traces of secondary disease may be discovered in the different cavities, joints, &c.

766. Prognosis. — Though we cannot say that the disease is without danger altogether, when severe, yet the proportion of deaths is so small, that in the great majority of even severe cases, our prognosis may be favourable; still more decidedly when the attack is slight.

767. Diagnosis.—The characteristic marks of the disease are, the time of its occurrence — after delivery; the uterine symptoms preceding — the pain down the thigh and leg — the swelling; but especially the painful, hard, cord-like femoral vein.

When the greater part of these symptoms is present, there can be no doubt of the nature of the disease.

768. Treatment.—The condition of the patient after confinement will of necessity somewhat modify the activity of the treatment.

Generally speaking, venæsection will not be required; but if the patient be of a plethoric habit, if she have in some degree recovered her confinement, and if the disease set in with great violence, it may be advisable.

Leeches, in numbers proportioned to the severity of the attack, should be applied along the course of the femoral vein, to the groins, or to the calf of the leg, and a poultice applied when they fall off. If decided relief be not obtained, they may be repeated in smaller numbers, once, twice, or thrice.

Calomel in small doses, alone or with opium, may be given with great benefit after leeching.

As the bowels are almost always in some degree disordered, appropriate remedies must be tried. If diarrhœa be not present, purgatives may be given, and we are advised to prefer the saline. I have certainly seen benefit result from small doses of Tartar emetic, given along with the cathartic.

Saline effervescing draughts may also be given.

Different statements have been made as to the effect of blisters; some regarding them as specifics, and others altogether rejecting them as mischievous. My own experience is in favour of them.

Turpentine fomentations are also decidedly useful.

When the pain is severe, or the patient irritable, restless, and sleepless, opiates will be necessary.

The diet should be bland, and chiefly farinaceous.

When by these means the acute stage has been terminated, and the constitutional symptoms relieved, we may change our local and general

treatment. Gentle support may be afforded to the limb by a light flannel bandage, and slightly stimulating friction employed.

In this stage the frequent application of small blisters has been especially recommended.

Tonics may also be given; bark, or quinine and sulphuric acid, will be found the most serviceable.

The diet may be improved; meat may be allowed, and a moderate portion of malt liquor, or wine.

If at any time the lochia should be offensive, vaginal injections of tepid milk and water, twice a day, should be employed.

After some time, air and slight exercise, with sea-bathing, will be found to conduce to the perfect restoration of the patient.

CHAPTER XXVI.

PUERPERAL MANIA.

769. Females may suffer from an attack of mania during gestation, during labour, or after parturition. The two latter cases will occupy our attention in this chapter. The temporary delirium, or mania, which occurs during labour, was, I believe, first recorded by my friend Dr. Montgomery. It appears at two particular periods of the labour; first, as the head passes through the os uteri, and again, at its exit through the os externum. It would appear to be owing to the extreme suffering at these times, acting upon an irritable and nervous temperament. It is very temporary, generally lasting but a few minutes, and then subsiding.

The most curious point about it is, that the patient is often conscious of her incoherence. A lady whom I attended, and in whom this delirium occurred, assured me that she knew she was talking nonsense, but that she could not resist it.

770. Puerperal mania, in the usual sense of the term, is by no means a rare disease. It may attack the patient a few hours or days after delivery, and more frequently before the lacteal secretion is fully established, although cases occur at a later period, and even appear to be the result of weaning.

Females of a nervous, irritable temperament, seem peculiarly obnoxious to it, and occasionally those of plethoric habit and of sensitive feelings. It is said to prevail especially during summer.

771. Causes. — It was formerly attributed to the suppression of the lochia, or to a metastasis of the milk.

More recently it has been attributed to local irritation of the breasts or other parts; to irritation and loss of blood combined; to the peculiar condition of the sexual system; to the disturbances of the vascular system, occasioned by delivery; or to the effects of suckling.

No doubt, also, it may be partly attributable to the shock which the nervous system receives at the time of labour.

Hemorrhage has been enumerated among the predisposing causes, and the exciting causes are said to be fright, anger, sorrow, or any species of mental emotion, disordered digestion, &c.

There is no reason to believe that it arises from inflammatory action in the brain.

772. Symptoms. — The attack may either come on suddenly, or gradually; in the former case the patient may, perhaps, awake out of sleep in a fright, and commence talking incessantly and incoherently; in the latter, she may have complained of head-ache for some days; of vigilance; or even entire sleeplessness. The loss of rest produces exhaustion and irritability, and her mind becomes depressed and fretful. In this condition, some fancied inattention or unkindness, or some annoyance, fixes itself, as it were, in her mind, and from talking constantly of it, she soon proceeds to talk irrationally about it. Once the mental integrity is broken, she ceases to be rational on any point except for a few moments, and, in fact, becomes insane.

As to the insane phenomena, they do not differ under these circumstances from insanity generally, and therefore I need not enter upon them.

There are two distinct classes of cases; those which are accompanied by fever and quick pulse, and those which are not; and this is, perhaps, the most important point in the history of the disease.

We find the former class of patients complain of head-ache, and throbbing in the head; the face is flushed, the eye unsettled and intolerant of light, the raving is incessant, and the patient difficult to restrain.

In the latter we find the pulse but little quicker than usual, and weak, the surface natural, and very little head-ache. The tongue is generally white and loaded, the stomach disordered, and the bowels confined.

773. Terminations. — 1. It may cease suddenly after twenty-four hours.

2. It may continue an indefinite time, and the patient ultimately recover.

3. It may terminate in death. This is almost peculiar to those cases where the pulse is quick, and fever is present.

4. A few patients continue in a state of permanent insanity, in whom it occurs after delivery.

774. Treatment. — It seems to be pretty generally agreed, that there are but few cases which require venæsection, and that in those cases it should be used most cautiously.

Leeches to the forehead or temples is a better mode of abstracting blood, if it be necessary.

If the loss of blood do no good, it is quite certain to do mischief, by weakening the patient, and increasing the irritability.

Some benefit will be derived from shaving the head, and applying cold lotions, or a bladder of pounded ice.

But more decided relief seems to be afforded by thoroughly freeing the bowels by purgatives and enemata, and then administering an opiate, when not counter-indicated by the state of the pulse.

Emetics have been recommended, but their value seems doubtful,

unless there be a necessity for evacuating some offensive matter in the stomach.

Antispasmodics — especially camphor, are said to be very useful.

Diffusible stimuli, in combination with the opiate, have been found very beneficial.

Tartar emetic, in small doses, will be of use, especially in cases where the pulse is quick, and may probably supersede the necessity for blood-letting.

Tonics will be beneficial when the mania subsides.

The utmost quiet will be necessary. The diet should be bland and nutritive.

Great skill must be exercised in the moral management of the patient, so as not to increase the irritation. There is more to be gained by the appearance of yielding to the wishes or whims of the patient, than by resisting them.

Some authors recommend that the patient should cease nursing, as the suckling may prolong the irritation.

"The first signs of recovery are to be observed in the abatement of the fits of agitation, in their violence, or the return of the right understanding, though for short intervals. It seems that peculiar address is required to foster any tendency to their natural habits, and by a sensible and wise management of these tendencies, the recovery may be much promoted."*

* It will be consolatory to the medical attendant as well as to the friends of the patient to know that these cases, alarming as they appear, almost invariably recover under judicious treatment. It has been very properly said that, "the question is not so much *whether* the patient will get well, as *when* she will get well." — Editor.

CHAPTER XXVII.

EPHEMERAL FEVER OR WEED.

775. This is a short attack of fever, to which females are especially liable during the early part of their convalescence, though it may occur at a later period.

Females of sensitive constitutions are most obnoxious to it.

776. Causes. — The most frequent cause is the impression of cold, perhaps on rising from bed, or changing the room, &c.

Indigestion, or irregularity of the bowels, may also give rise to it. Fatigue, mental agitation, and want of rest, are also enumerated among the exciting causes.

777. Symptoms.—The attack commences by general uneasiness, palpitation, and shivering, with head-ache, pain in the back and limbs, soreness of the skin, thirst, rapid and sometimes irregular pulse, &c.

To this succeeds a well-marked hot stage, with flushed face, throbbing temples, pain over the eyes, rapid full pulse, pain of the breasts, soreness of the abdomen, &c., and it terminates in a profuse sweat, which removes the fever, and relieves the other symptoms.

The tongue is coated, the stomach is often disturbed, and the bowels confined.

During the paroxysm, the fever often runs very high, and the distress is proportionally great. Occasionally the mind is confused and distressed; and in some cases the patient is delirious.

For the time, the secretion of milk is diminished or suspended, and the lochia also, but they return after the paroxysm.

The fit is generally completed in twenty-four hours, always in forty-eight; and if properly treated, it seldom returns. If neglected, however, it may assume the form of an intermitting, or continued fever.

Unless it assume this character, it is of very little consequence, and very easily managed.

778. Diagnosis.—From the violence with which it commences, it may easily be mistaken for puerperal fever; but the cessation of the paroxysm after some hours, and the absence of marked abdominal tenderness, will generally enable us to distinguish it. Indeed, the peculiar violence with which it commences, is itself more characteristic of weed than puerperal.

779. Treatment.—During the cold stages, hot bottles and warm bed-clothes may be applied, so as to relieve the distress. Warm drinks and cordials may also be given.

During the hot stage, a comfortable quantity of clothing must be continued, and diaphoretics given, so as to favour perspiration; and during the sweating stage, we must guard against cold, and diminish the clothing very gradually.

As for purgative medicines, which are necessary, I have found the combination of Salts, Senna, and Tartar Emetic, the most useful; but

any other purgative may answer the purpose. If the tongue be foul, and the stomach loaded, an emetic may be advisable.

Very rarely will it be necessary to take away blood, and then only if there be much local pain. A few leeches to the head, or to the breasts if they be painful, may be of use; but in the majority of cases they are unnecessary.

We should carefully examine the state of the uterine system, as irritation may otherwise go on unsuspected, and be the cause of much subsequent distress.

The diet may be nutritious after the paroxysm is over, and even mild tonics be given, if necessary. Dr. Campbell recommends five-grain doses of camphor, four or five times a day for some days, to allay nervous irritability.

Great care must be taken, after the fever has terminated, to avoid all occasion of cold, or any cause which may reproduce the attack.

INDEX.

A.

PAGE.

Abortion 179
Abdomen, enlargement of 150
Accidental hemorrhage 421
" " treatment of ... 423
" " transfusion in . 425
After-pains 228
Allantois 121
Amenorrhœa 86
Amnii, liquor 122
Amnion 114
Amputation of fœtal limbs in utero. 144
Anæthesia 284
Apoplectic convulsions 444
Apoplexy of child at birth 225
Arm presentations 394
Ascites 382
Asphyxia of child at birth 224
Auscultation in pregnancy 152

B.

"Ballottement" 152
Breech presentations 384
"Bruit placentaire" 153

C.

Callipers (*Note*) 57
Cæsarean section 358
" mode of operating 368
Canal of the pelvis 46
Carunculæ myrtiformes 61
Cephalæmatoma 225
Cephalic version 297
Cervix uteri in pregnancy 107
Changes in child after birth 143
Child, position of, in utero 137
" condition at birth 224
" abnormal condition 225
Chloroform 284
Chorion 112
Circulation in fœtus 142
Clitoris 60
Coccyx 39
Complex labour 409, 414, 420; 435, 447, 469
Conception 98
Convalescence after labour, normal. 226
" " abnormal. 231
Convulsions 435
" hysteric 435
" epileptic 436
" apoplectic 444
Corpus luteum 102
Craniotomy 341
" mode of operating 354

D.

PAGE.

Death of fœtus, signs of 177
Decidua vera 109
Decidual cotyledons 110
Development, laws of 143
Diameters of fœtal head 139, 200
" of pelvis 42, 43
Distortions of pelvis 49, 268
" " effects on labour, 271
" " treatment 271
Duration of pregnancy 158
Dysmenorrhœa 90

E.

Embryo, formation of 122, 127
Ephemeral fever 506
Epileptic convulsions 436
Ergot of rye 241
External organs of generation 58
Extra-uterine pregnancy 169
Extremities, inferior, presentation of, 390
" superior " " 394

F.

Face presentations 377
Fœtal life, physiology of 141
" circulation 142
" heart, pulsation of 154
" head, diameters of 139, 200
Fœtus, signs of death of 177
" measurements of 139
" pathology of 176
" position of, in utero 138
" laws of developement of ... 143
" movements of 151
" viability of 274
Fallopian tubes 71
Fever, puerperal 477
Fistula, vesico-vaginal and recto-vaginal 455
Flooding 420
Foot presentations 390
Forceps 312
" mode of operating 327
Forehead under pubic arch 382
Fourchette 62
Funis 120
" presentations 409
Funic souffle 155

G.

Generation, external organs of 58
" internal organs of 63
" conception 98

PAGE.
Gestation 105
Graafian vesicles 72

H.

Hemorrhage 420
" accidental 421
" unavoidable 426
" after delivery 433
Hydrocephalus, effect on labour ... 407
Hysteric convulsions 435
Hysteritis, puerperal 491
Hysterotomy 358

I.—J.

Ilium, os 36
Imperforate os uteri 256
Induction of premature labour 179
Inflammation of peritoneum 483
" of uterus 491
" of uterine appendages, 489
" of uterine veins 493
" of lymphatics 496
Innominatum, os 35
Instrumental labour 253
Introduction 33
Internal organs of generation 63
Interstitial fœtation 172
Inversion of the uterus 469
Ischium, os 36
Jacquemin's test of pregnancy 157
Joints of pelvis 39

K.

Kiesteine 156

L.

Labia majora 59
" minora 59
Labour, premature 179
" natural stages of 191
" symptoms of 212
" management of 218
" tedious 236
" powerless 270
" obstructed 255
" unnatural 377
" with distortion 268
" " malposition 377
" " mal-presentation 384
" " prolapse of funis 409
" " retained placenta 414
" " flooding 420
" " convulsions 435
" " lacerations 447
" " inversion of uterus ... 469
Lever or vectis 303
" " mode of operation .. 308
Liquor amnii 122
" " excess of 246
" " premature discharge of 247

PAGE.
Lochia 228
Lymphatics, uterine, inflammation of, 496

M.

Mal-position of child 377
" face presentations ... 377
" forehead to pubis 382
Mal-presentation 384
" breech 384
" inferior extremities ... 390
" superior do. ... 394
" compound presentation, 399
Mammary changes in pregnancy .. 147
Mania, puerperal 503
Maturity of child 140
Measurements of pelvis 47, 57
Mechanism of parturition 192
Membranes, toughness of 246
Menstruation 75
" cessation of 78
" causes of 79
" disorders of 86
" vicarious 90
Milk, the 229
Menorrhagia 94
Morning sickness 147
Mons Veneris 59
Monsters 406

N.

Natural labour 210
" symptoms of 212
" management of 218

O.

Obstetric operations, { 272, 290, 303, 312, 341, 358, 370
Obstructed labour 255
Os coccygis 39
Os ilium 36
Os innominatum 35
Os ischium 36
Os pubis 37
Os sacrum 38
Os uteri, rigid 244
" imperforate 256
Ovaries, the 71
" physiology of the 75
Ovarian fœtation 170
Ovum, changes in 100

P.

Parturient female, management of, after labour 230
Parturition 188
" classification of 189
" mechanism of 192
Pathology of fœtus 176
Pelvis, bones of, collectively ... 35, 41

PAGE.

Pelvis, joints of the..... 39
" cavity of the..... 44
" outlet of the..... 44
" axes of the..... 45
" canal of..... 46
" diameters of..... 42, 43
" external measurements.... 47
" " " (*Note*). 57
" distortions of.....49, 268
" planes of the, (*Note*)..... 194
Peritoneum, inflammation of..... 483
Phlegmasia dolens..... 498
Phlebitis, uterine..... 493
Physiology of uterus..... 188
Perineum..... 62
" laceration of..... 462
Placenta, the..... 114
Placental souffle..... 153
Placenta, management of..... 223
" retained..... 414
" prævia..... 426
" extraction of..... 428
Plural births..... 400
Podalic version..... 298
Position of fœtus in utero..... 138
Powerless labour..... 270
Pregnancy, signs of..... 145
" duration of..... 158
" twin..... 157
" extra-uterine..... 169
Premature labour..... 179
" " induction of..... 272
Presentation, breech..... 384
" of inferior extremities 390
" superior do. ... 394
" compound do. ... 399
Prolapse of funis..... 409
Pubis, os..... 37
" symphysis..... 40
Puerperal fever..... 477
" peritonitis..... 483
" hysteritis..... 491
" mania..... 503
Pulsation of fœtal heart..... 154
" funis..... 155

Q.

Quickening..... 150

R.

Recto-vaginal fistula..... 455
Retention of placenta..... 414
Rupture of uterus..... 447

S.

Sacrum, os..... 38
Salivation..... 147

PAGE.

Scalp, tumour of, at birth..... 225
Signs of pregnancy..... 145
Sexes, proportion of..... 140
Superfœtation..... 166
Suppression of the menses..... 89
Sterility..... 162
Symphyseotomy..... 370

T.

Tedious labour..... 236
Tubal fœtation..... 171
Tumour of scalp..... 225
Tunica media..... 113
Turning..... 293
Twin pregnancy..... 157
Twin births..... 400

U.

Umbilical cord..... 120
" pulsation of the..... 155
Unavoidable hemorrhage..... 426
Unnatural labour.... 255, 268, 377, 400
Urethra..... 61
" orifice of..... 60
Utero-gestation..... 105
Uterine-souffle..... 153
" phlebitis..... 493
" appendages, inflammation of 489
" lymphatics do. 496
Uterus..... 64
" arteries of..... 68, 106
" nerves of..... 68, 106
" double..... 69
" physiology of..... 75, 188
" inertia of..... 251
" inflammation of..... 491
" inversion of..... 469
" obliquity of..... 247
" rupture of..... 447

V.

Vagina..... 62
" orifice of..... 61
" examination of, in labour.. 214
Vectis..... 303
Veins, uterine, inflammation of.... 493
Version..... 293
Vesico-vaginal fistula..... 455
Vesicula alba..... 113
Vestibulum..... 60
Vicarious menstruation..... 90

W.

Weed..... 506
Weight of child..... 139

THE END.

NATIONAL LIBRARY OF MEDICINE
NLM 03192509 7